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Marathon to Merge Subsidiary with Menasha

Operations of Economy Paper Products Co. At Milwaukee Suspended and Will Be Consolidated At Menasha Plant of Marathon Paper Mills—Wisconsin Peace Act Upheld—Other Industrial News

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., January 13, 1941—Marathon Paper Mills Company has suspended operations at the Economy Paper Products Company, Milwaukee, Wis., a subsidiary acquired about five years ago, and is consolidating this plant with its Menasha Products division at Menasha, Wis., according to Don Snyder, manager of direct sales for the Menasha plant.

The Milwaukee concern, in business for almost a quarter of a century, was devoted mostly to the sale of waxed wrappings, chiefly for the baking industry. Equipment is being moved to Menasha, and eight or ten persons of the sales and administration personnel will operate hereafter from the Menasha offices. About 35 employees were on the Milwaukee payroll to whom approximately $70,000 was paid annually.

Wisconsin Peace Act Upheld

Wisconsin's employment peace act has twice withstood tests before the state supreme court to declare it unconstitutional. In a decision rendered last week, the court ruled that the act is not in conflict with the national labor relations law, and could be applied in labor disputes involving firms engaged in interstate commerce.

The law prohibits strikes unless a majority of the workers vote for it, and restricts picketing to prevent abuses and disorder. The case in question affirmed an order of the Wisconsin Labor Board which found 14 members of a CIO union guilty of unfair labor practices arising from disorderly conduct during a strike at the plant of the Allen-Bradley Company, Milwaukee.

Kimberly-Clark Plan Sales Program

Preparatory to development of an enlarged sales program for Kimsul, the insulation material being manufactured at the new coarse wadding mill of Kimberly-Clark Corporation, about 50 members of the sales force for this product held a three-day conference at the company's offices at Neenah, Wis. last week. The visitors were taken on trips through the various plants of the corporation, including the new machine room where Kimsul is being made. A dinner was held at the Valley Inn, where F. J. Sensenbrenner, president, spoke on the history and background of the firm. Motion pictures of Kimberly-Clark operations entitled "The Romance of Paper" were shown by S. F. Shattuck, vice-president.

S. F. Shattuck, vice-president of Kimberly-Clark Corporation, was reelected president of the Kimberly State Bank, Kimberly, Wis., at the annual meeting Thursday of last week. The bank is located in the company's mill village.

Directors reelected by the First National Bank, Menasha, Wis., at the annual meeting Tuesday, January 7, include Leo Croy, vice-president of Marathon Paper Mills Company and sales manager of its Menasha Products division; R. M. Sensenbrenner, vice-president and general manager of George A. Whiting Paper Company, Menasha; Hugh Strange, secretary-treasurer and general manager of the John Strange Paper Company, Menasha, and F. B. Whiting, president of George A. Whiting Paper Company. Officers are to elected later.

Lee Turley, sales promotion manager for the Nekoosa-Edwards Paper Company, Port Edwards, Wis., is given credit for organizing a unique boys' club in the mill village. Its purpose is to instill in the boys the ideals which will best fit them for success in life. It provides a combination program of work and play.

The club is directed by a board of directors of which J. E. Alexander, president of the paper company, and F. G. Kilp, chief forester, are members. Mr. Alexander paid half of the salary of a director until the club became self-supporting and furnished the materials for a lodge 38 by 50 feet in size on Nepco Lake, created artificially by the Nepco dam. The boys operate a garden in the summertime, the products of which are sold.

The lodge was completed last fall, and will be available for camping next summer. Land was provided on a long term lease by the company, and includes not only the lodge but a baseball diamond,

(Continued on page 17)

Royal Commission Ends Abitibi Co. Inquiry

Twelve and One-Half Day Probe Into Affairs of Abitibi Power & Paper Co. Concluded—G. T. Clarkson, Receiver-Manager, Testifies Sale of Abitibi Assets Would Be Unfavorable At Present Time.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., Jan. 13, 1941—After sitting for a total of 12½ days, the Royal Commission enquiring into the affairs of Abitibi Power and Paper Company, concluded the hearing of evidence at noon January 8. To say that the evidence taken at this enquiry was voluminous does not stretch the truth in the least. The galaxy of legal luminaries appearing for the multitudinous interests sometimes made the legislative assembly chambers seem like a convention of the legal profession. A plethora of plans for the rescue of the great power and paper empire from receivership came before Mr. Justice McTague and his fellow commissioners, every plan having its own group of supporters. Many witnesses were called and recalled to give evidence and opinion and out of all this the commissioners are expected shortly to extract a set of recommendations that will prove satisfactory to all.

Abitibi Receiver Testifies

The first witness heard when the commission resumed sittings on January 6 was G. T. Clarkson, receiver and manager of Abitibi. Mr. Clarkson had appeared previously and had been requested by the commission to prepare a plan of reorganization which he could recommend as feasible.

Mr. Clarkson emphasized his belief that Abitibi should be taken out of receivership as soon as possible. He also expressed some concern about the future of the prorating scheme now in effect by the newspaper industry in Ontario and Quebec. He felt that this scheme was weakening as some companies in both provinces had been disregarding its provisions. He also felt that much of the value of Abitibi properties depended on the continuation and proper regard for proration.

Mr. Clarkson proposed that the company be reorganized on a plan that would avert its sale and provide the bondholders with some form of new security to cover overdue interest.

Present Time Unfavorable for Sale

"If the property is put up for sale again before the court it will not be sold for the amount of the bondholders' claims," Mr. Clarkson told the commission. "Conditions are uncertain," he explained, "no one can tell what the earnings will be. There is only one way I see by which the affairs of the company can be arranged with the certainty that it would not go back into receivership if things got bad. That is, if the present bonds were left as they are, and, dependent upon the effect of taxation, either talons (coupons), as suggested by Mr. McPherson (R. S. McPherson, the liquidator, who had also submitted a plan), or income debentures, or preferred shares were issued for the overdue interest (approximately $26,000,000) and the junior securities left just as they are, but interest on the bonds be payable only under the following conditions:

"At the end of each fiscal year, if the net working capital exceeded the fixed minimum, the surplus should be applied to pay interest, and if there is anything above, to purchase these securities to go to the bondholders.

Believes Bondholders Should Control

"But in the meantime, the bondholders should have complete control of the company's affairs and nothing should be paid to the junior security holders until the bondholders' debt has been reduced to a certain point. That is a matter for discussion.

"If that were done, the bondholders would get everything there is to get and the junior security holders would be left as they are. There would be some disabilities.

"The contention of some of the bondholders," Mr. Clarkson continued, "is that if you give them a security upon which interest is payable only when it is earned or when the net working capital exceeds a certain amount, it is an income-bearing security, for which there is no proper market.

"If you make interest payable only when there is a surplus of assets, you have a non-enforceable security.

"The third thing is the question of taxes. Nobody knows where they are at. If you issued preferred shares, or income debentures, for the interest, they might be taxed as income.

"So whatever they take—whether talons or preferred shares or income debentures, for their overdue interest, or whether they could afford to take them—is a matter dependent upon what the excess profits will be and how it is interpreted.

"That is the only way in which I can see that, with the present debt and the uncertainties of the future, the re-organization of Abitibi can be arranged."

Possible Reorganization Discussed

In discussing the possible re-organization of Abitibi, Mr. Clarkson suggested a number of alternatives and emphasized that concessions from the government were essential for a sound company operation, mentioning again the excess profits tax. He fears recurrence of competition on a price basis from Europe after the close of hostilities and thought that as a protection against this, the Canadian industry should be permitted to retain a larger proportion of any profits it might make during the war years. In the event of the sale of the properties, Mr. Clarkson said that any bonds issued by the company should not exceed $24 millions. This would be half the existing funded debt. Any additional capital should be raised by shares or income debentures.

Mr. Clarkson agreed with A. G. Slaght, counsel for shareholders, that the present would be the worst time to obtain an adequate price for Abitibi properties at a forced sale. He said it was impossible at present to find prospective British purchasers because of British regulations restricting release of sterling. Mr. Slaght asked about prospects of securing United States capital and Mr. Slaght said that any money

coming from that source would come in at a premium but that they might have difficulty in getting it out. There are investors in the United States, he claimed, who feel this is a very good time to invest in Canada. "I have no reason to believe that investors would not invest here because of present conditions," he added.

Expressing the hope that Canadian newsprint would not go above $50 a ton, Mr. Clarkson said if it went higher there would be more competition from southern pine newsprint.

Questioned by Glyn Osler, counsel for the bondholders' protective committee, the receiver said the total owing to the bondholders at the end of September was approximately $74,000,000 and $82,174,200 in U. S. funds, in which the bonds are payable. Of that amount, $26,000,000 is overdue interest, he added.

Mr. Osler also wanted to know if Abitibi could pay four or five percent on the bondholders' debt over a period of years, to which Mr. Clarkson said he could not say.

Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., January 15, 1941—Mudge Paper Company has been awarded the contract for furnishing 3,275 pounds (25,000 sheets) of 32 x 43 India tint super-calendered book paper at 6.02 cents. Same firm has also been awarded the contract for furnishing 8,057 pounds of 48 x 73½ white super-calendered book paper at 5.19 cents; 27,060 pounds of same in 56¼ rolls at 4.762 cents; 10,700 pounds same 37½ x 60, at 5.19 cents; 10,240 pounds of green and buff 34 x 44 sulphite writing paper at 7 cents; and 6,111 pounds of 75% rag, 45 x 63 white map paper at 13.06 cents. Bids for all of these items were received on December 30.

Barton, Duer & Koch Paper Company will furnish 5,000 pounds of 100% rag, 23 x 36 white ledger paper at 18.23 cents. Mudge Paper Company will furnish 5,000 pounds of 24 x 36 high finish red sulphite paper at 7 cents. Bids for both of these items were received on December 20.

Paper Corp. of U. S. will furnish 36,000 pounds of 21 x 32 manila cardboard at 10,000 pounds same 22½ x 28½ at 4.32 cents. Mudge Paper Company will furnish 24,000 pounds of No. 2, 320 lbs. kraft wrapping paper and 20,000 pounds same 200 lbs. at 4.34 cents. R. P. Andrews Paper Company will furnish 532 pounds of 35 x 45 goldenrod coated book paper and 320 pounds same 38 x 50 at 14.6 cents. Marquette Paper Company will furnish 14,400 pounds of 20 x 25 blue smooth M.F. cover paper at 6.63 cents. Mudge Paper Company will furnish 125,000 sheets (16,375 pounds) of 32 x 43 India tint book paper at 6.02 cents. Bids for all of these items were received on December 18.

Stanford Paper Company will furnish 9,648 pounds of 25½ x 33 white declaration bond paper at 24.5 cents, and Mathers-Lamm Paper Company will furnish 4,300 sheets of 22 x 28 buff railroad board at $62.50 per M sheets. Bids for these items were received on December 16.

Printing Office has received the following bids for 19,800 pounds of 50% rag, 26 x 34 white natural tint passport paper; Mudge Paper Company, 13.22 cents; Old Dominion Paper Company, 12.47 cents; Aetna Paper Company, 13.12 cents; and Barton, Duer & Koch Paper Company, 14.50 cents.

N.P.T.A. Plans Convention

Plans are being completed for the 38th Annual Convention of the National Paper Trade Association. The convention will be preceded, as usual, by a meeting of the executive committee on Sunday, February 16, but the formal convention program and the exhibit of wrapping paper, paper products, twines and kindred lines will occupy Monday to Thursday, February 17-20. Headquarters will be at the Waldorf-Astoria which, at the same time, will accommodate the meetings of the A. P. & P. A.

Such meetings as will be held during the coming convention will provide a source of information and a focus of ideas and experience invaluable in the management of a business in these trying times. It is also expected that a representative of the Council of National Defense will address the convention, setting forth the policies and outlining the requirements of the Council as affecting the distribution of trade and the industry as a whole.

In the divisional sessions, committee meetings, etc. tops of vital interest to fine and wrapping paper merchants will be scheduled for discussion and illuminating statistical information will be presented reflecting the operations of both branches of the trade during the past year. In the wrapping division especially, new programs and activities now under way will receive exposition and promotional effort.

The officers of the Association now devoting their best attention to Convention arrangements are P. W. Lesh, Indianapolis, President; C. E. Roach, Springfield, Ill., Vice-President, Wrapping Division; J. H. Brewer, Boston, Vice-President, Fine Paper Division, and C. W. Vernon, New York, Treasurer. The other members of the Executive Committee are, D. J. Werner, New York, J. M. Sturm, Cincinnati, C. H. Maurinus, Rochester, L. S. Pollock, Dallas, and former President F. T. Jamison, Pittsburgh.

As indicated by the following list of exhibiting manufacturers and converters whose reservations have already been received, this exhibit now a regular feature of the convention programs of the association will undoubtedly be the largest and most impressive, as well as educational, that has ever been held:

Dennison Manufacturing Company, Self-Locking Carton Company, Midland Products, Inc., Riegel Paper Corporation, Crystal Tissue Company, Gaylord Container Corporation, Gilson Brothers Inc., Orchard Paper Company, Oval Wood Dish Corporation, Sealright Company, Inc., Loroco Industries, Inc., Lily-Tulip Cup Corporation, Oneida Paper Products Company, The Hinde & Dauch Paper Company, The American Paper Goods Company, Industrial Tape Corporation, A. W. Archer Company, Inc., Brown Company, McLaurin-Jones Company, Reed Tissues Corporation, Sutherland Paper Company, Hy-Sil Manufacturing Company, Universal Paper Products Company, North American Pulp & Paper Company, National Pad and Tablet Corporation, Pejepscot Paper Company, Better Packages, Inc., Rexford Paper Company, Boston Drinking Cup Company, White-Washburne Company, Inc., Cleveland Mill and Power Company, Erving Paper Mills; Hoberg Paper Mills, Sherman Paper Products Corporation, Racquette River Paper Company, Herz Manufacturing Company, Voorhis-Tiebout Company, Inc., Dixie-Vortex Company, Sanitor, Inc., Eagle Cup Corporation, John M. Hart Company, Inc., Central Paper Company, (Muskegon), Mosinee Paper Mills.

Chicago Reports More Active Paper Market

Improvement In Demand For Many Lines of Paper This Week Expected To Expand Into Big Sales Volume This Year—Printers Report More Business—Paper Men To Hear Talk By S. S. Weil.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., January 13, 1941—While no particular indication of rising prices has been noticed in the Chicago markets, there is a quite noticeable stiffening of the majority of the lines. Demand since the first of the year has shown activity and it has been sufficiently diversified to indicate that 1941 should prove a good year to the industry. Whether or not this sales improvement will be matched by sufficient reduction in costs and increased margins of profit to show abandonment of the "profitless prosperity" era remains to be seen.

Kraft Papers Strong

Kraft papers were strong during the week, holding well on gains built up during the pre-holiday buying. Sulphites reported strength in inquiries and a good volume of sales. The bond paper market, in general, showed a more healthy undertone according to reports. Books and covers revealed more activity during the week as buyers of advertising and publicity material began to go into the jobber market. Printers indicated a marked increase in activity. Groundwoods held firm to upward as better demand moved in while newsprints were similarly improving. Boards were reported as steady to strong. Wastepapers were listed as "firm".

Paper Association Meets January 14

The Chicago Paper Association will hold its next meeting on January 14 when representatives of the coarse paper industry will gather to discuss what the new president, S. S. Weil, describes as "a rather chaotic state due to a hit-or-miss program of operation on the part of the jobbers". It will be the first meeting under the presidency of Mr. Weil who is secretary of Joseph Weil & Sons, Inc., He was elected a short time ago and explained his willingness to accept the job in a letter sent to all members of the Association just before Christmas. In this letter Mr. Weil pointed out that he would accept the responsibility only if every member could be counted upon to cooperate in doing a real job in 1941. Vice presidents elected at the December meeting are J. F. McNulty, McNulty Paper and Twine Corporation and Robert Levinson, head of the Eagle Wrapping Products Company. R. E. Knox of Knox & Schneider is the secretary-treasurer of the association. Directors are H. E. Weinstein, Western Bag & Paper Company and William Chukerman of J. Chukerman & Sons along with Louis Levin and Albert Steindler, honorary directors. It is expected that major attention in 1941 will be given over to an educational program designed to thoroughly review costs in order that each member may make the most of a demand which is reportedly showing marked improvements at this time.

An Apology to Harold Pfister

This department wishes to apologize to Harold Pfister of the Macintosh Paper Company for one of those "force of habit" slips. Harold was listed as being with Bradner Smith & Company when we commented upon his excellent piano playing at the recent Christmas party of the Salesmens Association. Mr. Pfister has been with the MacIntosh organization for over a year—and we are happy to correct the error. Incidentally, his piano playing is still good.

To Distribute Northwest Product

Timberland Book in both English finish and eggshell, a product of the Northwest Paper Company, will be distributed by the Chicago Paper Company in the future. The paper is said to have a uniformly smooth surface and greatly increased opacity and has already proven to be very popular in local markets.

Chicago Club Gets New Member

While a number of Chicago sales offices of well known paper manufacturers collaborated to help the Chicago Club of Printing House Craftsmen celebrate "Paper Night" recently, the organization found additional time to receive the membership of O. L. Bilz of the Crocker-McElwain Company. Mr. Bilz' addition gives about twelve mills representation on the roster of this exceptionally active organization.

R. A. Curtain Wins Contest

Crocker-McElwain's Certificate Bond National Letterhead Rating contest developed a Chicago prize winner in the person of R. A. Curtin of the LaSalle Paper Company who developed—or countersigned—the letterhead of the United Charities of Chicago. The letterhead rating contest was held in connection with the Fifteen Best Letterheads of the Year on Certificate Bond competition.

P. J. Maasbyll Retires

WESTBROOK, Me., January 13, 1941—After being connected with the pulp and paper industry in Rumford and this city for more than 50 years, Peter J. Maasbyll of Forest Street, head of the soda mill and kneader room of the S. D. Warren mill, has retired.

Born in Abl, Schleswih, now a part of Germany, Mr. Maasbyll studied to be a teacher, while being employed in creameries operated by an uncle. His father was a body guard of King Frederick VII of Denmark.

Coming to this country at the age of 18 to avoid having to serve in the German army, he was employed for some time in creameries and then entered the employ of the S. D. Warren Company as a laborer in 1890. In 1901 he went to Rumford as night superintendent of the soda mill of the Oxford Paper Company, returning to the Warren mill here three years later in the same capacity. After being made a day superintendent, he was head of several departments providing raw materials for paper manufacture and with their reorganization in 1918 he became superintendent of the soda mill and kneader room.

Canadian Pulp and Paper Men To Meet Soon

Annual Meeting of Canadian Pulp and Paper Association Will Be Held January 29 to 31—Program Lists Many Interesting Features —Charles R. Vining Reviews Newsprint Industry—Other News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., January 13, 1941—The annual meetings in connection with the Canadian Pulp and Paper Association will take place here on Wednesday, Thursday and Friday, January 29, 30 and 31. The Technical Section will meet on each of these days to hear papers on technical and operating problems generally and for group discussion. Among those presenting papers will be Dr. H. E. Fritz, of the Goodrich Rubber Company, who will deal with synthetics, and Dr. John S. Bates, former chairman of the section, who will discuss, "Canada's Future in Pulp."

Interesting Program Prepared

The Woodland Section will also meet on the three days to discuss matters connected with forestry, and at their luncheon on Wednesday the speakers will be E. W. Tinker, executive secretary of the American Paper and Pulp Association, who will deal with "The impact of the war on the pulp and paper industry in the United States." On Thursday there will be a joint luncheon of the two Sections, when the guest speaker will be Westbrook Steele, executive head of the Institute of Paper Chemistry, Appleton, Wisconsin, who will discuss some phase of research.

President to Review Year's Activities

On Friday the annual luncheon of the Association will be held in the Mount Royal Hotel, when the President of the Association, F. G. Robinson, will present on behalf of the Executive Committee a review of the year's activities. He will also award two gold medals to members of the Technical Section for the best papers presented to the section—the Weldon medal and the Howard Smith medal. Immediately following the luncheon the annual meeting of the Association will be held for the election of officers and submission by the chairmen of the various sections of reports covering the different branches of the pulp and paper industry. In view of the war there will be no annual dinner and none of the usual entertainment.

Importance of Newsprint Industry

Charles R. Vining, president of the Newsprint Association of Canada, reviewing the newsprint industry for the past year, says that at the present time Canada's newsprint manufacturers have two jobs: (1) to help provide Canada with the foreign exchange on which the ability to wage war depends; (2) to preserve stable and dependable conditions of supply to sustain a free press as an essential weapon of democracy. He holds that the industry is admirably fulfilling these functions. In 1940 it obtained something like $125,000,000 American funds from shipments to non-British countries, as well as several millions of pounds sterling from shipments to the British Isles and other parts of the Empire. The total, he thinks, probably established a new record. He also says that after gold and rubber, newsprint yields more United States dollars than any other commodity in the British Empire. As to supply he says the Canadian mills had enabled United States publishers to function without fear of shortage or high cost, adding the interesting estimate that in 1940 something like 10 billion copies of American newspapers were printed on newsprint from Canadian mills. He says Canada still has in excess of a million tons of unused capacity in its newsprint mills.

Britain Fixes Newsprint Quota

According to information received here, the British Government has fixed the quota for the import of newsprint into the United Kingdom during 1941 at 200,000 tons from Canada and Newfoundland, as compared with 325,000 in 1940. The unused quota of last year, 70,000 may also be imported, bringing the total newsprint import for this year to 270,000 tons.

Bark Beetle Finds a Defender

Surprising to forestry men is the statement by A. R. Gobeil, a member of the entomological branch of the Department of Agriculture in Quebec, that the spruce bark beetle may be among those insects which are a blessing in disguise. He admitted that the beetle had caused an economic loss estimated at $100,000,000 in Canadian timber during the last three years, but said "We might be hardly justified in classifying this insect as economically injurious, since it feeds mostly on the surplus tree populations, thus preventing diseases and competition." He added that this insect has what amounts to a mathematical sense, since it generally attacks trees 18 or more inches in diameter, thus weeding out over-age trees which, when they fall to the ground, are destroyed by fungi and cease to be fire hazards.

To Hold Hearing on Converted Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., January 15, 1941—A public hearing on minimum wage recommendations of 36, 38 and 40 cents an hour for the Converted Paper Products Industry to be held January 29, has been announced by Colonel Philip B. Fleming, Administrator of the Wage and Hour Division, Department of Labor. Henry T. Hunt, Principal Hearings Examiner of the Division, will preside at the hearing.

Any interested person may appear, either in support of or opposition to the recommendations, provided that he files a notice of intention to appear with the Administrator not later than January 23. The notice must contain the name and address of the person appearing; name and address of the person or persons he represents, if any; if his appearance is for or against the recommendations; and the length of time required for his presentation.

The definition of the industry covers all occupations necessary to production including clerical, maintenance, selling and shipping occupations.

Pacific TAPPI Discuss Water Requirements

"Water Requirements in Pulp and Paper Manufacture" a symposium conducted by the Pacific Section of the Technical Association of the Pulp and Paper Industry proved to be one of the best organized and most successful of the monthly dinner meetings. It was held January 7 at the Nora Self Hall in Camas, Washington, home of the large specialty paper mill, Crown Willamette Paper Company Division, Crown Zellerbach Corporation.

F. A. Olmsted, chairman of the Pacific Section TAPPI was in charge of arrangements and presided at the meeting. Niles Anderson, chairman of the local group of the American Pulp & Paper Mill Superintendents' Association announced that the joint spring meeting of TAPPI and the Superintendents' Association would be held June 6-7 in Portland, Oregon. The chairman of arrangements is Harry H. Richmond. Mr. Olmsted stated the next two meetings of the Pacific Section TAPPI would be held February 4 and March 4 in Tacoma and Longview, respectively.

Among the 111 in attendance were men representing the waterworks field who participated in the group discussion, including Ben S. Morrow, City Engineer and Manager of the Water Bureau of Portland, Ore.; S. L. Benedict, System Engineer, Water Bureau, Portland, Ore.; Carl E. Green, director Oregon State Dept. of Sanitary Engineering; Curtiss M. Everts, Jr., Assistant Sanitary Engineer, Oregon State; and R. M. Harris, Director Washington State Department of Public Health Engineering.

The program was admirably prepared and directed by E. P. Wood, Technical Director, Pulp Division, Weyerhaeuser Timber Company, Longview. It was a symposium on water treatment in which the following participated in the organized program. Otto Hudrlik of The Flox Company; Wm. R. Gibson of the Northwest Filter Company; G. O. Wilson of The Dorr Company; Earl G. Thompson of Great Western Division Dow Chemical Company; and Brian L. Shera of Pennsylvania Salt Mfg. Company of Washington.

Each of the above men gave an introductory statement on a phase of water treatment practice and followed this up by a detailed account of the particular subject.

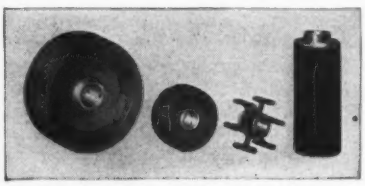
Those in Attendance

A list of those in attendance follows: Burton R. Adams, Leslie L. Anderson, Niles M. Anderson, R. E. Astle, Geo. Bailey, W. R. Barber, E. P. Barthelemy, Geo. H. Beisse, C. H. Belvin, Sydney J. Benedict, Louis H. Blackerby, Robt. A. Bremner, Thos. F. Buford, Robley Butler, Claude Callaghan, G. R. Chambers, G. W. Charters, R. E. Chase, Jr., Claud Christiansen, Fred Covell, J. D. Darby, O. T. Defieux, R. E. Drane, Alec C. Duncan, M. L. Edwards, A. E. Erickson, Donald Erickson, John T. Evans, Curtiss M. Everts, Jr. Lyle G. Fear, Donald G. Felthous, Francis W. Flynn, M. J. Franklin, G. H. Gallaway, William R. Gibson, Harvey Glenn, D. C. Greeley, Carl E. Green, H. W. Hall, R. N. Hammond, Roy M. Harris, R. S. Hatch, S. Hazelquist, W. J. Higbie, W. S. Hodges, J. G. Hoffman, Jr., Cylde F. Holcomb, W. F. Holzer, Otto L. Hudrlik, J. H. Hull, Henry Jacobsen, W. C. Jacoby.

Lyal Jones, W. N. Kelly, Robert B. Kirkwood, John LeTourneux, J. Raymond Lindquist, John J. Lobb, G. A. Lorenz, R. W. Martig, T. R. Martin, Vern L. Mauerman, G. H. McGregor, Cornelius John Meagher, O. F. Michaelis, Paul F. Miescke, P. V. Millard, H. Norman Miller, R. G. Mispley, T. H. Moran, C. W. Morden, Ben S. Morrow, A. G. Natwick, A. Newcomb, Max R. Oberdorfer, F. A. Olmsted, A. W. Olson, F. M. Pape, Morris M. Peterson, John C. Plankenton, E. D. Rich, Herman Richard, C. B. Roberts, Grant D. Ross, H. L. Rudow, Jack V. Savage, Barton W. Sawyer, Harlan Scott, Brian L. Shera, D. L. Shinn, Larry K. Smith, L. E. Stevenson, C. F. Stevey, Bert E. Sullivan, F. F. Sullivan, A. Ward Tedrow, Earl G. Thompson, V. L. Tipka, R. M. True, R. O. Vognild, R. D. Waddell, John E. Walkky, Fred J. Weleber, C. Kelly Wells, L. E. Williams, Jack Wilcox, G. O. Wilson, Chas. H. Witt, Jr., Zina A. Wise, Edward P. Wood, Herbert Wymore.

Rockwood Fibre Rolls

Many kinds and types of machines are equipped with rolls, frictions or pulleys whose purpose is to transmit power by carrying tapes, ribbons, or belts, or by rolling contact with other parts. Although the power required is often quite small the maintenance of exact speed is usually necessary for the most effective use of the machine. Fiber rolls permit less slip and therefore maintain best the needed speeds. Again and again it has been demonstrated by making rolls, frictions or pulleys of Rockwood Fiber that machine performance has been very definitely improved.



The improvement may be in greater production, better quality of work or in longer life of rolls, tapes or belts with lower maintenance expenses and less time lost. This matter of keeping speeds at a certain pre-determined point for best machine performance is one that does not receive as much attention from machine designers, builders and users as it warrants.

Rockwood has developed a new construction for small and medium sized rolls which provides a tough rugged hub and spider of zinc alloy, stronger than iron, cast under high pressure right into the body of fiber.

Inquiries, including sketches of present rolls and a description of load and service conditions, are welcomed and should be addressed to Rockwood Manufacturing Company, Hamerstadt Street, Indianapolis, Indiana.

Tissue Association Warns Against Short Measure

Whenever cost of raw materials and labor on toilet tissue are increasing there is a tendency on the part of a few marginal producers to offset these increasing costs by reductions in quality, sheet size or sheet count which deceive the consumer into thinking that he is getting the same article at the same price as in the past regardless of increasing costs. The great body of manufacturers and distributors, who give the consuming public full value, combat such methods at all times as an unfair practice which exploits the consuming public.

Statement by Mr. Fife

Ross A. Fife, executive secretary of the Tissue Association, states that the toilet paper industry at the present time appears to be going through one of these recurrent waves of unfair competition which calls for vigilance and prompt action on the part of manufacturers, distributors and consumers to keep it under control. The Tissue Association plays its part in combatting such unfair practices by sounding this note of warning to distributor and consumer.

As far back as 1924 the tissue paper industry requested the cooperation of the United States Department of Commerce through its Division of Simplified Practice in bringing about general acceptance of standards for various tissue paper items and as a result of this activity initiated by the Tissue Paper Manufacturers Association (now The Tissue Association) Simplified Practice Recommendation R46 for Tissue Paper was published in 1926. This recommendation set 4½ inches as the minimum dimension for individual sheets of roll toilet paper, the other dimensions being 4½, 4¾ or 5 inches. With relatively few exceptions, this standard of size has been closely adhered to by the roll toilet industry ever since that time. Currently a few scattering producers are taking advantage of the fact that the average consumer expects to get a sheet of standard size and will rarely take the trouble to check the size by putting out rolls having sheets 4½ x 4 inches only.

By this practice the marginal producer trades on the established standards for sheet sizes for one or both the following purposes: a. To increase his own profits, or b. To undersell his competitors who give full standard measure and value at greater cost to themselves.

If their efforts were to continue unchecked established manufacturers might be tempted to meet this type of competition, with a resulting breakdown in the standards of sheet sizes for roll toilet tissue and probably with an accompanying breakdown in other standards, all to the eventual disadvantage of the consumer. Prompt and effective publicity by the trade association in cooperation with paper merchants, other wholesalers and consumers at such times brings these unfair practices down to the irreducible minimum of those whom the responsible units in the industry can afford to disregard.

The problem of short count and mislabelling can be very easily handled nowadays through the increasingly effective weights and measures departments of practically all states and municipalities. Mr. Fife states that The Tissue Association has found these officials anxious to cooperate in all cases where fraudulent practices are called to their attention.

Past experience shows that warning publicity and the cooperation of various weights and measures officials will bring satisfactory results in checking unfair competition on roll toilet tissue if the reputable manufacturers, paper merchants, wholesale grocers and others manufacturing and distributing these items as well as the consumer will cooperate with The Tissue Association by promptly reporting all cases which come to their attention and by sending in samples of fraudulently labeled or otherwise irregular roll toilet tissue. Such cooperation, particularly from paper merchants and other wholesalers affected by unfair trade practices, is essential if The Tissue Association's efforts to protect the consuming public are to be wholly successful.

The Tissue Association, which is located at 122 East 42nd street, New York City, is always glad to get information regarding short count and undersize sheets or any other form of unfair competition. Copies of Simplified Practice Recommendation R46 for Tissue Paper will be promptly sent on request.

New Literature

Pyrometers of the high speed photo-electric action type, are discussed in Catalogue No. 1101F, issued by the C. J. Tagliabue Manufacturing Company, Park and Nostrand avenues, Brooklyn, N. Y. It lists and describes the "Celetray" line and the latest improvements. Photo-electrically balanced recorders, indicators, controllers, recording controllers, potentiometers for thermocouples, etc., are included.

Motor control engineering is the subject of a booklet issued by Cutler-Hammer, Inc., 315 North 12th street, Milwaukee, Wis. It describes the company's "Unitrol" unit type of standardized motor control. This system is compact and takes up relatively little floor space. All needed control devices are enclosed in a sectionalized motor center. Dimensions, unit ratings and a sample specification are given.

Roller and ball bearings in industrial power transmission service, is covered in detail in a new 88-page data book No. 1775, issued by the Link-Belt Company, 307 North Michigan avenue, Chicago, Ill. It gives information on the company's "Friction Fighter" bearings. Tables of sizes, dimensions, weights and list prices are given. Selection of the proper unit for each class of service, with engineering information is covered. Unmounted bearings are also included.

Control of stock preparation is the subject of a folder issued by The Bauer Bros. Company, Springfield, Ohio. It describes the operation of the Bauer Classifier, for accurately checking, beating or refining operations by fractionating screen classification of fibers.

May Investigate Purchase of Pulpwood

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., January 15, 1941—Representative Fulmer of South Carolina has introduced a resolution in the House (H. J. Res. 15) "to investigate the apparent monopolistic purchasing of pulpwood by pulp and paper mills under a contract purchase system from farmers and other owners, price of fixing of paper and other pulp products under trade practice rules and regulations including cost of distribution."

Resolution

The resolution, which has been referred to the House Committee on Agriculture, is as follows:

Whereas the present war in Europe has disrupted and will continue to disrupt the normal flow of pulpwood, wood pulp, and paper into the United States from other countries, especially from the Scandinavian countries, resulting in a further heavy drain upon our forest resources in the United States; and

Whereas because of the increased demand for pulpwood and because of the continued increase in the consumption of paper which has been tremendously increased during the past fifteen years; and

Whereas it takes about two standard cords of wood to produce a ton of paper for which, according to an investigation just made by a special congressional committee, pulp and paper mills are paying the very low price of from five to seven dollars per what they call a unit, containing one hundred and sixty cubic feet, delivered to the mills, and from said price farmers, under an apparent, monopolistic buying program by the mills, especially in the South, receive only from 15 cents to $1 per cord for stumpage; and

Whereas the pulp and paper mills have recently advanced the price of paper from $65 to $85 per ton, and, in that this advance in price of paper has not been reflected in prices paid for stumpage and pulpwood, particularly to owners, including farmers and wages paid wage earners for cutting and hauling pulpwood, which are on a starvation basis: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Federal Trade Commission is authorized and directed to investigate (1) the apparent monopolistic purchase procedure of pulpwood through contractors and prices being paid to these contractors and the price paid to subcontractors and buyers of pulpwood and the price paid to farmers and owners of pulpwood, including standard of wages paid in pulp and paper mills to wage earners, including wages paid for cutting and hauling pulpwood; (2) the current cost of producing and distributing wood pulp and paper; (3) any related factors required in determining whether wage earners, farmers, and other forest owners or operators are receiving for their wages, stumpage, and pulpwood a fair and equitable share of the sale price of pulp and paper during the past year and a fair and equitable share of the 30 per centum recent increase in the price of paper; (4) the relationship of pulp and paper mill associations of which the manufacturers of pulp and paper are members; and (5) the influence and control that these associations have over the operations of their members as to controlled production, distribution, and the actual fixing of prices under trade practice rules and regulations formulated and agreed to by members of said associations.

SEC. 2. For the purposes of this joint resolution, the Federal Trade Commission, through its authorized representatives, is authorized and directed to hold hearings at such times and places in the District of Columbia and elsewhere in the United States, to employ such experts and such clerical, stenographic, and other assistants, to require by subpœna the attendance of such witnesses and the production of such books, papers, and documents, to take such testimony, and to make such expenditures, as it deems necessary in connection with this investigation; and oaths or affirmations may be administered by any authorized representatives of said Federal Trade Commission. Other agencies of the Government shall, upon request of the Federal Trade Commission, furnish said Commission with such available information in the conduct of this investigation as it deems necessary. In case of contumacy or refusal to obey a subpœna issued under this joint resolution to any person by the Federal Trade Commission or its authorized representative, any district court of the United States, including the District Court of the United States for the District of Columbia, within the jurisdiction of which said person guilty of contumacy or refusal to obey is found or resides, upon application by the Federal Trade Commission or its authorized representative may issue to such person an order requiring such person to appear before the Federal Trade Commission or its authorized representative, or an examiner designated by the Federal Trade Commission, there to produce documentary evidence if so ordered, or there to give evidence touching the matter in question; and any failure to obey such order of the court may be punished by said court as a contempt thereof. No person shall be excused from attending and testifying or from producing books, papers, contracts, agreements, and other documents before the Federal Trade Commission or its authorized representative; or in obedience to the subpœna of the Federal Trade Commission or its authorized representative, on the ground that the testimony or evidence, documentary or otherwise, required of him, may tend to incriminate him or subject him to a penalty or forfeiture; but no individual shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter, or thing concerning which he is compelled, after having claimed his privilege against self-incrimination, to testify or produce evidence, documentary or otherwise, except that such individual so testifying shall not be exempt from prosecution and punishment for perjury committed in so testifying.

SEC. 3. The Federal Trade Commission shall report to the Senate and the House of Representatives as soon as practicable the result of this investigation. If the Senate or House is not in session, the report shall be made to the Speaker or the President of the Senate, as the case may be.

SEC. 4. There is hereby authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, the sum of $25,000 for conducting this investigation.

The Story of Wild Bill McCannah

By Ogden Brouwer, Jr.

Some fifty-seven years ago, an Irish boy was born up in old Ticonderoga, N. Y. As soon as he could walk, he played around a paper mill, and he has been playing around them ever since! According to his story, there is not a paper mill in the entire East that he has not worked in at one time or another. The general opinion, however, is that it has been a long time since he has worked in any paper mill! His present occupation is to work the paper mills from the president down. In fact, Bill is now one of the last of our so-called "paper mill tramps" who used to travel from mill to mill subsisting on the kind-hearted generosity of the paper mill people and curling up on cold winter nights to sleep beside the boilers in the boiler house. Bill often does better than this; and his good friend, Andy, has fixed up a cot and shower for Bill just off of the finishing room where Bill is a welcome guest.

This honest and good-hearted "Celt" has a winning smile, usually a rotten cigar, and sometimes a breath. His usual line is as follows: "Gimme a couple of bucks, will ya? I am going to take the next bus to Newburgh and see my old pal Roy, and you won't see me around again here for a couple of months." A day or two later, you will get a postal card from the Irish-American Hotel as follows: "Everything fine. Have a client for a paper mill, and etc. Have a good used screen and a Bird Saveall for sale, and send me a check for five, General Delivery, North Bennington, Vt."; and so it goes. Bill has his regular rounds and plenty of entres. He will barge into the office of the president of a paper mill and say; "Hello, Jack" just like that—and he gets away with it, too. The Albany night boat crew know "Wild Bill" well; and he bunks on a sack of potatoes in the hole for $1.00 the trip. From upstate New York, where he regularly touches Abe—that generous soul and also his friend Graham—who never turns him down—to Reading, Pa. and from Richmond, Va. to New York City, Bill plys his wiles.

God Bless the Old Guy anyway; and one day when he has passed away, many a good man will shed an honest tear for his old friend "Wild Bill" McCannah.

Clarence A. Wiswall Recovers

[From our regular correspondent]

Reading, Mass., January 13, 1941—Clarence A. Wiswall, who began his career as a papermaker in the South during the Civil War, later operating mills at Newton Lower Falls, subsequently becoming a box maker, has been seriously ill with pneumonia. Mr. Wiswall recently published a book on the history of paper-making in New England.

TO MERGE SUBSIDIARY

(Continued from page 9)

tennis court and archery range. Facilities also are provided for swimming and sailing. Activities also include handiwork, using manual training shops of the public school.

Thilmany Credit Union Reports on Loans

The credit union of Thilmany Pulp and Paper Company, Kaukauna, Wis., closed the year 1940 with $46,682 in assets. It made 706 loans during the last year. Monthly safety contests are conducted by the mill, and the winners in December were Jule Toms of the bag mill, and Leroy Klein, who works on a rewinder in the paper mill.

Charles L. Blanchard 94 Years Old

Charles L. Blanchard, who founded the Standard Paper Company, Milwaukee, Wis., one of the largest jobbing concerns in Wisconsin, celebrated his ninety-fifth birthday Saturday, January 4, at his home. The concern was started in 1883, and Mr. Blanchard retired from active business eleven years ago.

Combined Locks Gets Contract

Among the recent contracts awarded by the War Department was one for $63,436 to the Combined Locks Paper Company, Combined Locks, Wis. The contract covered purchases of target paper.

A. B. Hansen Talks on Defense

A. B. Hansen, executive vice-president and general manager of the Northern Paper Mills, Green Bay, Wis., was the speaker at a meeting of the Neenah Club, Neenah, Wis., Monday, January 13. His subject was "Industry and National Defense." F. J. Sensenbrenner, president of Kimberly-Clark Corporation, was program chairman for the meeting.

To Rebuild West Dudley Mill

[From our regular correspondent]

West Dudley, Mass., January 6, 1941—Plans for a new and more modern structure to replace the West Dudley paper mill destroyed yesterday by a two hundred fifty thousand dollars fire were being hurried tonight as Webster firemen ended a 40-hour vigil in sub-freezing temperatures. Many of the 90-employes who usually work at the concern will work on the erection of the new building.

Preparations for a new mill moved rapidly this morning after company engineers examined the huge steam turbines, valued at thirty thousand dollars each, and determined they were not damaged beyond repair. The data on the turbines was sent to Lowell Emerson of Pawtucket, R. I., owner of the plant, who arrived this afternoon to consult with other officials.

A contract for the removal of all scrap iron by a Springfield concern was signed this afternoon and a wrecking crew will begin tomorrow to remove many tons of bent and twisted girders and other metals.

Negotiations were also opened by Mr. Emerson for steel to be used in the new building. Orders were also placed for lumber and other materials to protect machinery that may be salvaged. A temporary shelter for the steam turbines was completed late today by emergency workers.

S. Walter Inc. Celebrate at York

The annual party of S. Walter, Inc., organization and branches was held this year at York, Pa., in honor of Bertram R. Moore's twenty-fifth anniversary as manager of Andrews Paper House of York—twelve years during the R. P. Andrews' ownership of this concern and thirteen years since it was taken over by S. Walter, Inc., and made a division of this corporation.

There was a turn-out of the entire organization, the Allentown division motoring up to York in their cars, and the Philadelphia branch arriving early in the afternoon via chartered Greyhound bus. The ladies of the Allentown and Philadelphia divisions were taken in charge by the ladies of the York organization, and the men of the organization, salesmen, etc., went into conference at the York house, reviewing plans for the coming year. Mr. Walter presided and gave a brief sketch of the steady growth of the business, paying tribute to the splendid loyalty and cooperation of the organization at all houses.

After a general discussion of plans for the future, etc., the party proceeded to the Yorktowne Hotel, and, accompanied by their wives and guests, sat down to a banquet, followed by dancing and general merriment.

Mr. Walter, during the evening, referred to Mr. Moore, now vice-president of the company, and as a tribute to his twenty-five years of loyal service presented him with a gold wrist watch. Mrs. Moore and Mr. Walter were presented with appropriate gifts by the York employees, as was also Mr. Moore.

Mr. Walter reviewed briefly the operation of the company during the past year, commenting on the excellent showing, and was very pleased that they were able to follow a custom established several years ago, of having the employees of all three houses share in a substantial bonus. He thanked all for what they contributed, and suggested that all shoulder the responsibility of an industry so vital to the needs of national defense, and reflect a spirit of optimism so needed in these troubled times, moving about with perfect cooperation among themselves and the community in general.

Remarks were made by B. R. Moore and T. F. Kennedy, vice-president, Harry Lefkowith, manager of the Philadelphia house, and Eugene Parks, manager of the Allentown branch. Each spoke briefly of plans for their houses for the year to come.

E. A. Hirschman, secretary of the Chamber of Commerce, spoke of the responsibility of a citizen in business and paid tribute to Mr. Moore, as a model of what a good business man can do, in addition to his own work, in promoting the welfare of his community.

Canadian Technical Section Meeting

A. E. Cadman, secretary of the Canadian Pulp and Paper Association, has extended a friendly invitation to members of the Technical Association of the Pulp and Paper Industry to attend the annual meeting of the C.P.P.A. Technical Section to be held at the Mount Royal Hotel, Montreal, P. Q. on January 29-30-31, 1941.

In addition to several very interesting round table discussions the following papers will be presented:

1. Reduction of Horsepower and lower consistency grinding. M. A. Macdonald, Price Bros. & Company Limited.
2. Reduction of Waste in wood preparation. S. C. Whipple and M. W. Price, Canadian International Paper Company, Limited.
3. Changes in mill equipment to overcome difficulties. Robert L. Fraser, Consolidated Paper Corporation, Limited.
4. Effect of pit consistency with the miniature grinder. H. Andrews, Powell River Company, Limited.
5. Automatic Control in Sulphite digester. L. J. Rioux, Fraser Companies Limited.
6. Comparative operation of 12 knife and 4 knife chippers. Hoyt B. Savage, Canadian International Paper Company, Limited.
7. Benefits of forced circulation and chip packing. T. R. Moore and I. W. Prendergast, Gaspesia Sulphite Company, Limited.
8. Training for the Pulp and Paper Industry. J. N. Stephenson, *Pulp and Paper Magazine.*
9. Inter-relation of process water and pitch trouble. L. Lonnquist, Canadian International Paper Company, Limited and G. A. Sutton, St. Lawrence Paper Mills, Limited.
10. Bark and refuse fuel burning. E. J. Calnan and J. W. Franklin, Quebec North Shore Paper Company, Limited.
11. Hardwood utilization by the Paper Industry. K. D. Running, Anglo-Canadian Pulp and Paper Mills, Limited.
12. Moisture in paper. C. N. Candee, Howard Smith Paper Mills, Limited.
13. Synthetics. Dr. Fritz, Goodrich Rubber Company, Limited.
14. Dr. John S. Bates, first Chairman of the Technical Section, will speak on a subject to be announced later.

TAPPI Notes

Russell J. LeRoux, formerly of the Interlake Division, Consolidated Water Power and Paper Company, is now superintendent of the Everett, Wash., Division of the Weyerhaeuser Timber Company.

Frederick Streicher of Dill & Collins, Inc. is now Major, Cavalry, Headquarters First Military Area, Philadelphia, Pa.

Johannes Westergaard, formerly of Atterbury Brothers, is now vice president of Castle & Overton, New York, N. Y.

Frederick Wierk, formerly of Johnson & Wierk, Inc., is now chief engineer in charge of design for the U. S. Naval Air Station, Quonset Point, R. I.

The TAPPI Pacific Section will meet at Tacoma, Wash. on February 4, 1941.

The TAPPI Kalamazoo Valley Section will meet at the Columbia Hotel, Kalamazoo, Mich. on Thursday, January 23, 1941. Dunlap C. Clark, president of the American National Bank of Kalamazoo, will be the speaker.

The TAPPI Ohio Section will meet at the Manchester Hotel, Middletown, Ohio on Saturday, January 25, 1941. The speaker will be George Mead, president of the Mead Corporation, Chillicothe, Ohio.

The TAPPI Delaware Valley Section will meet at the Engineers Club, Philadelphia, Pa. on Friday, February 7, 1941. The speaker will be Dale Purvis, Treasurer and Operating Manager of the Stetson Hat Company who will talk on "Industrial Relations".

You could consult a Ouija Board . . .

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WHEN the answer to a business problem lies in a far-off city, you can span the distance *instantly* by Bell System Teletypewriter Service.

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Winners in Corroflex Contest

Instead of the 14 prizes originally offered by the Sherman Paper Products Corporation in its Corroflex Contest, recently concluded, 27 awards were made. "Entries," reported Sears L. Hallett, sales director of the Corroflex Division, "were so exceptionally numerous and of such excellent quality, that the judges, in addition to awarding the 14 scheduled prizes, added 13 honorable mentions, with each of which was given an electric calendar-clock."

First prize of $250 was awarded to Joseph Frisbee of Bradner Smith Company in Chicago, while second prize of $100 was awarded to John N. Bland of the J. L. N. Smythe Company in Philadelphia, Pa. Other cash prizes ranged from $50 to $25 each.

The contest was based on ingenuity and sales skill in making new sales of Corroflex, the flexible corrugated packing material. Unlike other contests the elements of numbers of entries or volume were not considered.

Judges in the contest were, Sylvan Hoffman, publisher of "Shipping Management" magazine, John Bradshaw, packaging enginer, Pyrene Manufacturing Company and Stanley McKenzie, purchasing agent, U. S. Rubber Products, Passaic, N. J. plant.

"The contest," reported Mr. Hallett, "the first ever to be staged by the Corroflex Division revealed surprising, information as to the extent to which Corroflex could be used. Entries ranged from seaplane anchors to lingerie, from machine tools to jewelry, for use in airplane shipments as well as lining for freight cars.

The list of jobbers' salesman winning in this contest are as follows:

WINNERS IN CORROFLEX CONTEST

Award	Salesman	Distributors	City
1st $250	J. S. Frisbee	Bradner Smith	Chicago, Ill.
2nd 100	John N. Bland	J. L. N. Smythe	Philadelphia, Pa.
50	Leonard Yates	Industrial Paper & Cordage	Pawtucket, R. I.
50	Leonard Coplan	Ringel Brothers	Newark, N. J.
50	Elton Knapp	Union Paper & Twine	Detroit, Mich.
50	Marvin Morris	Criterion Paper & Twine	New York City
50	Herbert Page	John Leslie Paper	Minneapolis, Minn.
50	Spence Devenish	Carter Rice & Co.	San Francisco, Cal.
25	Jack Burcher	United Paper	Richmond, Va.
25	R. B. Church	McNeil Paper	Charlotte, N. C.
25	Jos. McLaughlin	Carter Rice	Boston, Mass.
25	Charles L. Lang	Hubbs & Howe	Cleveland, Ohio
25	H. F. Boehm	Hubbs & Howe	Buffalo, N. Y.
25	C. J. Hahn	Blake, Moffitt & Towne	San Francisco, Cal.

HONORABLE MENTION

Telechron Electric Clock	W. L. Scranton, Jr.	Chatfield Paper	New Haven, Conn.
"	Richard J. Miller	A. E. MacAdam	Brooklyn, N. Y.
"	E. M. Williams	Industrial Paper	Baltimore, Md.
"	L. E. Inman	The Paper Supply	Kansas City, Mo.
"	Ted Leek	Capital Paper	Indianapolis, Ind.
"	Walter Pierson	Ruby Products	Milwaukee, Wis.
"	Robin Moore	Mayer Myers	Memphis, Tenn.
"	M. Wilkinson	E. C. Palmer	New Orleans, La.
"	W. T. Hood	Pinellas Paper	St. Petersburg, Fla.
"	M. M. Scharff	Smith Scharff	St. Louis, Mo.
"	R. W. Busse	Chas. F. Hubbs	New York City
"	E. L. Allgood	Blake, Moffitt & Towne	San Jose, Calif.
"	D. B. Stirling	Blake, Moffitt & Towne	Los Angeles, Calif.

A.P.P.A. Luncheon Meeting

The 64th Annual Convention of the American Paper and Pulp Association and affiliated organizations will be held at The Waldorf-Astoria, New York, N. Y., February 17-21, 1941. By direction of the executive committee of the association, a Luncheon Meeting will be held at 1:00 P. M. on Monday, February 17, 1941.

The luncheon will be for the specific purpose of presenting to the members of the industry the program carried on by the association over the past year and plans for the future. It will take the form of a business meeting and it is hoped will result in a clear-cut understanding of the program of the association as well as the policies approved by the executive committee that control future action.

It is the earnest desire of the executive committee that all members of the industry attend.

New Literature

Lifting and hoisting devices are described in a 32-page catalogue, issued by the Economy Engineering Company, 2653 West Van Buren street, Chicago, Ill. It covers portable and stationary lifters, hand and electrically operated, fixed height and telescoping frame lifting apparatus. Details of construction, specifications and applications are included.

Multicolor analine printing is the subject of a folder issued by H. Heinrich, Inc., 208 Varick street, New York. It describes the Cottrell-Heinrich analine printing press for two to six colors, at speeds up to 1000 feet of web per minute.

Jacket water coolers are discussed in Bulletin No. W-100, issued by the Condenser Service and Engineering Company, 310 Tenth street, Hoboken, N. J. Construction details, technical data, cooler dimensions and typical installations are included.

Fabricating and welding stainless clad steel, is discussed in a 16-page booklet, entitled "Manual of Welding IngAclad", issued by the Ingersoll Steel and Disc Division, Borg-Warner Corp., 310 South Michigan avenue, Chicago, Ill. It discusses latest improvements and techniques in forming, bending, welding, heat treating, cleaning, grinding and polishing stainless clad steel. A list of applications for the company's "IngAclad" is included.

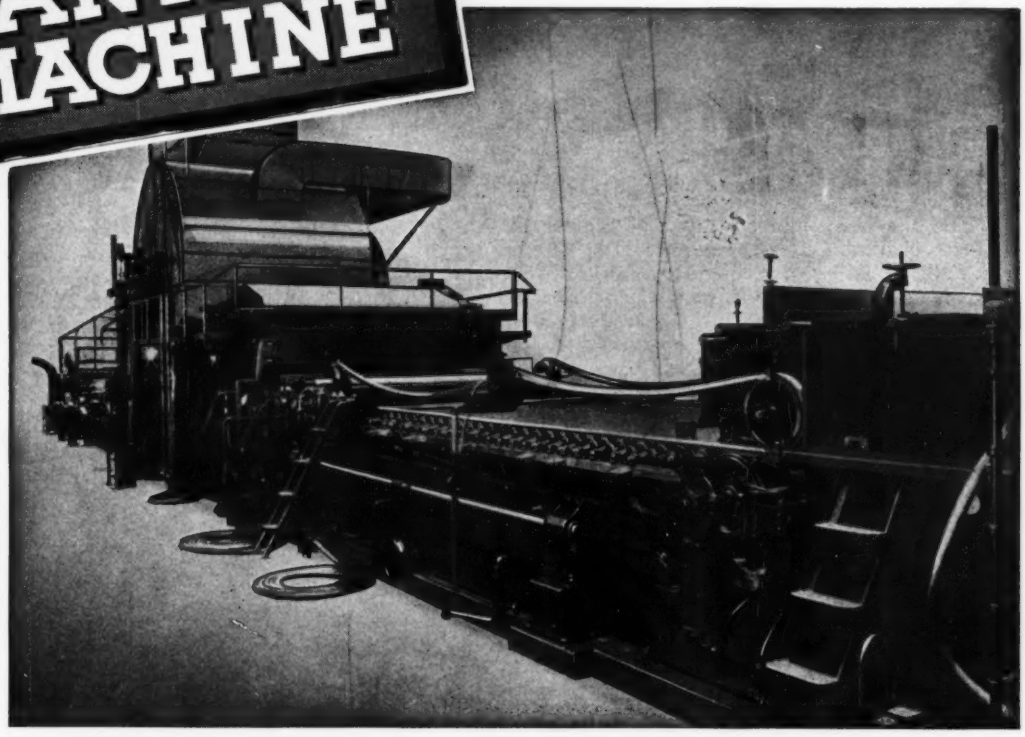
Temperature instruments for electric power equipment, is the subject of Catalogue N-22-161, issued by the Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, Pa. It describes in detail the company's "Micromax" instruments, thermocouple and potentiometer, thermohm and Wheatstone bridge, generator field and Kelvin bridge and L&N apparatus to meet each of a wide variety of temperature applications occurring in eelctric power generation and transmission.

All-in-one "Electrifugal" pumps are discussed in Bulletin B-6140, issued by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. It describes pumps for 1 to 10 h.p., inclusive for heads up to 160 feet.

MacCollum Paper Co. Incorporates

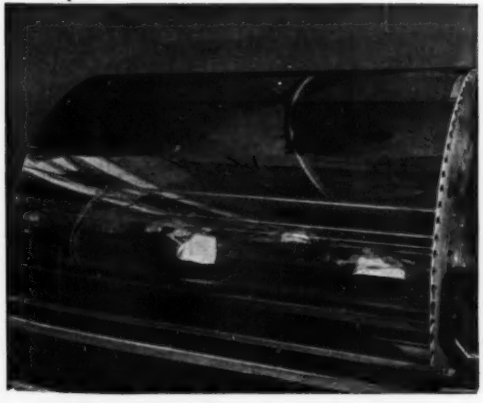
INDIANAPOLIS, Ind., January 3, 1941—Articles of incorporation have been filed with the Indiana secretary of state by the MacCollum Paper Company, Inc., 224 West Maryland street, Indianapolis, formed to do a general wholesale paper and stationery business. The corporation has 1,000 shares of no par value capital stock and the incorporators are Elizabeth Getz MacCollum, Glenn G. Gilland and M. Spears MacCollum.

THE Beloit YANKEE MACHINE



● The Beloit Yankee Machine furnishes an economical easy means of diversification. No other machine has the all-around adaptability to fit the needs of mills making specialty papers, both light and heavy weights.

The machine is provided with all the latest features: Removable Fourdrinier ...High Speed Super Shake...Suction Rolls...High Pressure Dryer...Hypoid Drive, etc.



Beloit has developed a special alloy metal and special grinding and polishing process to produce the close grained, hard mirror finish shown in this photograph. This is a result of Beloit's many years of experience in building practically all the Yankee machines in this country.

Beloit has also recently developed a high pressure Yankee dryer to meet the demand for maximum production.

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Paper and Twine Club Plan Banquet

Stanley H. Andrews, chairman of the banquet committee of the Paper and Twine Club, announces that preliminary plans are well advanced for the annual dinner of the organization to be held during Paper Convention Week. The affair will be staged in the Grand Ball Room of the Waldorf-Astoria on Wednesday evening, February 19, and the program calls for an evening exclusively devoted to entertainment.

The committee plans an elaborate stage review comparable to the best that is offered by the Great White Way. Although first announcement of the banquet was made as late as January 15, treasurer H. P. Price reports that checks have already been received from five concerns for 106 reservations. Last year the attendance was 480 and the committee believes that this total will be exceeded this year.

The dinner committee consists of Stanley H. Andrews, chairman, H. P. Andrews Paper Company; E. F. "Bud" Miles, vice-chairman, Crocker-McElwain Company; H. P. Price, treasurer, A. Price & Son; Alfred S. Walden, Walden, Sons & Mott, Inc.; Dan Mahoney, Lily-Tulip Cup Corporation; Arthur H. Pohlman, A. W. Pohlman Paper Company; James F. Levens, George W. Millar & Company; Stanley O. Styles, Martin Cantine Company.

The reception committee includes George S. Johnston, Champion Paper and Fibre Company; C. J. Wittrock, Paragon Paper Company; Russell S. Madden, American Writing Paper Company; George Goodsir, Mid-States Gummed Paper Company; Thomas Goulard, Walker-Goulard-Plehn Company; Donald Macauley, S. D. Warren Company; Adolph Warshow, Majestic Paper Corporation; Jacob Nacht, Union Card and Paper Company; John A. Howe, F. W. Anderson and Company; Leo Greenebaum, Willmann Paper Company.

Also Fred Schlosser, Schlosser Paper Corporation; L. E. Sayre, Canfield Paper Company; John D. Johnston, Gaylord Container Corporation; George W. Sisson, 3rd, Racquette River Paper Company; Frank W. Vaughan, Tested Papers, Inc.; Simon Walter, Philadelphia; Frank H. Purington, Eastern Corporation; Elmer E. Cole, Henry Lindemeyr & Sons; E. J. Durkin, O. & W. Thum Company; Robert H. Ziegler, National Paper Trade Association; Fred A. Mann, Dennison Manufacturing Company.

Mr. Andrews emphasized that one does not have to belong to the Paper and Twine Club to make reservations. Tables, he said, will be allotted as checks are received. Ten will be seated at a table.

Reservations and further information may be obtained from the Banquet Committee of which Stanley H. Andrews, 14 West Third street, New York, is chairman, and treasurer, H. P. Price, 663 Broadway, New York.

Brotherhood Holds Banquet at Harrisville

[FROM OUR REGULAR CORRESPONDENT]

HARRISVILLE, N. Y., January 13, 1941—The annual banquet of the local branch of the International Brotherhood of Papermakers and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers was held last week with a large attendance. Kyler Paul, president of the union, served as chairman at the gathering. The principal speeches were given by officials of the unions.

Base Price of Sulphur Unchanged

As a "voluntary contribution to the government's effort to prevent an upward spiralling of prices," the Freeport Sulphur company has announced that there will be no increase in the base price of an amount of sulphur sufficient to meet the demands of its customers for one year at the current rate of sales. In 1940 the Freeport company produced approximately 850,000 tons of sulphur at its mines in Texas and Louisiana.

The announcement was contained in a letter from Langbourne M. Williams, Jr., president of the company, to Edward R. Stettinius, Jr., in charge of raw materials, and Leon Henderson, in charge of commodity prices, of the National Defense Advisory Commission.

"Confirming the policy which the Freeport Sulphur company has adopted as a voluntary contribution to the government's effort to prevent an upward spiralling of prices, and which I outlined to you at our conference in Washington," Williams wrote, "there will be no increase in the base price of our product with respect to an amount of sulphur sufficient to meet the demands of our customers for one year at the current rate of sales.

"I am glad to have had your assurance that this action will be of value to you in your effort to stabilize commodity prices," he said.

"In addition to making this definite commitment regarding our price policy," the letter continued, "we hope that there will be no necessity for increasing the base price of sulphur after this tonnage has been sold, and we shall adhere to our present policy insofar as we are able to do so, taking into consideration costs of material and labor, and the effect of federal and state taxes.

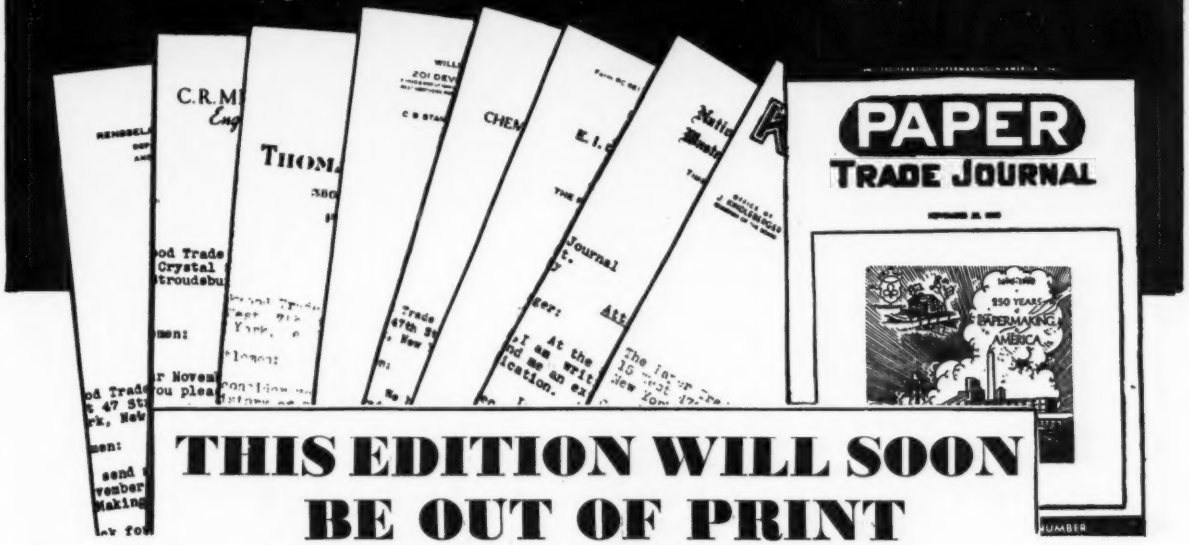
"I wish the Commission the greatest success in its effort to hold down commodity prices, and, as I expressed myself to you in our conference, I firmly believe that voluntary action on the part of individual companies can be a most effective method of obtaining this objective."

The Freeport company recently announced that its subsidiary, Cuban-American Manganese corporation, which has developed a process for making the low-grade manganese deposits of nearby Cuba available to the steel industry, is increasing its productive capacity from 100,000 to 130,000 tons. This enlarged capacity, undertaken to help meet increased demand for manganese as a result of the national defense program, is to be available shortly after the first of the year, Freeport officials have stated.

TO MAKE PAPER NAPKINS IN KALAMAZOO

KALAMAZOO, Mich., January 13, 1941—Beach Products, Inc. has started installing machinery in a Kalamazoo plant and will begin the manufacture and nation-wide distribution of paper table ware products on or about February 1, according to an announcement by the president, R. W. Beach of Indianapolis. Under the trade name, "Handi-Set", the firm will manufacture and sell matched sets of decorated paper table ware, Mr. Beach explained. The company is leasing the fireproof, modernized factory building at the corner of Factory and Reed streets and expects to employ 50 persons at the start.

DO YOU WANT extra copies ?



THIS EDITION WILL SOON BE OUT OF PRINT

"Kindly send me a copy of the Paper Trade Journal for November 28, 1940, containing '250 Years of Paper Making in America'."

Rensselaer Polytechnic Institute

"We would like to get six additional copies of your November 28, 1940 issue of the Paper Trade Journal."

C. R. Meyer & Sons Company

"We consider your current issue, which includes a history of Paper Making in the United States a very fine piece of work. Will you please send us five additional copies . . ."

Thomas M. Royal & Company

"We have noted with much interest Section 11 of Paper Trade Journal, November 28, 1940. . . . we should be glad to receive a copy for the files of our Technical library."

War Department, Alice M. Amoss, Librarian

"Your November 28th historical edition was most interesting. Will you not please send us six additional copies of this . . ."

William O. McKay

"Is it possible to secure a separate copy of Section 11 of the November 28, 1940 issue of Paper Trade Journal? If so, will you please send us one."

E. I. du Pont de Nemours & Co.

"Will you please send us 3 more of your Paper Trade Journals for November 28, 1940?"

Kalamazoo Vegetable Parchment Co.

"I am writing you to ask if you would be good enough to send me an extra copy of the November 28, 1940 issue. I am particularly interested in Section 2 of this issue because of the wealth of information it contains regarding numerous paper mills, etc."

National Association of Waste Material Dealers, Inc.

THE history of papermaking in the United States from the time of the original mill of William Rittenhouse in 1690 to the present day was printed in the November 28th issue of Paper Trade Journal.

We have had many requests for additional copies of the issue from many organizations not directly connected with this industry. Believing that our subscribers should have the advantage of securing extra copies before the edition is out of print we suggest that you order any extra copies you want now.

The price is $1.00 per copy and this issue should be in the file of every one who has any interest whatsoever in the pulp and paper industries.

The information contained in this history of papermaking is not obtainable in any other single book.

LOCKWOOD TRADE JOURNAL COMPANY, INC.
15 West 47th St, New York City, N. Y.

CONSTRUCTION NEWS

Westfield, Mass.—Stevens Paper Mills, Inc., manufacturer of special tissue stocks, insulated papers, etc., has plans for new one-story addition, for which superstructure will be placed under way soon. Bids have been asked for structural steel framing. New unit will be used for expansion in production division. No estimate of cost announced.

Kansas City, Mo.—The Waxide Paper Company, Twenties and Tracy streets, manufacturer of waxed and kindred paper goods, printed stocks, etc., has awarded general contract to T. G. Schweiger Contracting Company, 1525 Michigan avenue, Kansas City, for one-story addition. Work will be placed under way at once. No estimate of cost announced. John R. Brunt and Charles H. Bleistein, New York Life Building, are architects; William Cassell, 912 Baltimore avenue, is mechanical engineer.

Fall River, Mass.—The High Point Paper Box Corporation has been chartered with capital of 1000 shares of stock, no par value, to operate a local plant for the manufacture of corrugated paper boxes and containers. The new company, it is said, will be identified with the J. & J. Corrugated Box Corporation, 230 Winter street; Emanuel M. Jaffe of the last noted company is president of the new organization. Eric Erickson, Sr., is vice-president; and Alfred Miller, treasurer.

Marrero, La.—The Celotex Corporation, Marrero, near New Orleans, manufacturer of insulating board, wall board and kindred products, has awarded general contract to the E. B. Ludwig Construction Company, Inc., 1350 Jefferson highway, New Orleans, for proposed new addition to local mill, recently referred to in these columns, to be one-story, about 195 x 300 feet, for storage, distribution and other operating service. It will be known as warehouse No. 2, and is reported to cost close to $140,000, with equipment. An award for foundations has been made to the Glassell-Taylor Company, 318 Carondelet street, New Orleans. Work is scheduled to be placed under way at once. George H. Burt is company engineer in charge. Main offices are at 919 North Michigan avenue, Chicago, Ill.

Somersworth, N. H.—The Textile Fiber Company, Waltham, Mass., manufacturer of fiber specialties, has acquired the former plant of the Great Falls Woolen Mills at Somerworth, idle for about two years past. Company will take immediate possession and will remodel and equip for new mill for production of finished fiber materials. Operations are scheduled to begin at early date. Frank Coyne is president.

Wilmington, Del.—The Cork-Tex Products Company, 16th and Locust streets, Wilmington, manufacturer of insulating board and allied products, has approved plans for new one-story mill, 120 x 200 feet, to be equipped for large capacity. It is estimated to cost over $85,000, with equipment. General erection contract has been let to John E. Healy & Sons, Inc., 707 Tatnall street, Wilmington, and work will be placed under way at once. Robinson, Stanhope & Manning, Equitable Building, Wilmington, are architects.

Middletown, Ohio—The Sorg Paper Company, manufacturer of bond, book and other paper stocks, has work under way on new one-story addition, previously referred to in these columns, to be used for storage and distribution. It is reported to cost approximately $40,000, with equipment. Completion is scheduled soon. Martin L. Bauer, Manchester road, Middletown, has the general erection contract. Pretzonger & Pretzinger, Reibold Building, Dayton, Ohio, are architects.

New Companies

Passaic, N. J.—The Inter-City Paper Corporation, Passaic, has been organized with capital of 1000 shares of stock, no par value, to deal in paper products. New company is represented by Milton Dickman, Passaic, one of the incorporators.

New York, N. Y.—The Excel Container Corporation has been chartered with capital of 35 shares of preferred stock and 165 shares of common stock, to manufacture and deal in paper boxes and containers. New company is represented by Samuel L. Wallerstein, 271 Madison avenue, New York, attorney.

New York, N. Y.—The No-Mar Products Corporation has been organized with capital of 250 shares of preferred stock and 100 shares of common stock, no par value, to manufacture and deal in fiber products. New company is represented by Morris Bailinson, 18 East Forty-first street, New York, attorney.

Newton, N. J.—The Anken Company, Newton, has been incorporated with capital of 2000 shares of stock, no par value, to deal in paper products of various kinds. New company is represented by George K. Campbell, Newton, one of the incorporators.

New York, N. Y.—The International Tissue Corporation has been chartered with capital of $200,000, to manufacture and deal in tissue and allied paper stocks. New company is represented by Prentice-Hall, Inc., 90 Broad street, New York, agent.

Simplified Practice on Board

The Division of Simplified Practice, of the National Bureau of Standards has announced a reprinting and reissuance of Simplified Practice Recommendation R44-36, Box Board Thickness, to meet a continuing demand for the publication. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each.

This recommendation is of direct interest to the manufacturers and users of paper boxes, because of the information it contains relative to thicknesses of various kinds of paperboard. Also shown are definitions, and the method of determining the weights of odd-sized sheets of this material.

This simplification program was promulgated, initially, on October 1, 1925. The 1936 revision was based on the existing standards of the National Paperboard Association, and was reaffirmed in 1940 prior to re-publication.

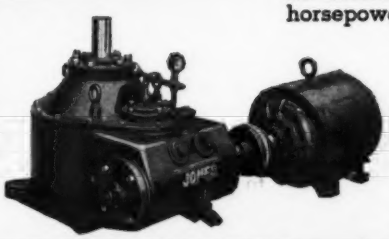
For driving agitators, mixers and similar equipment—

JONES WORM-HELICAL SPEED REDUCERS

HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.

• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications.

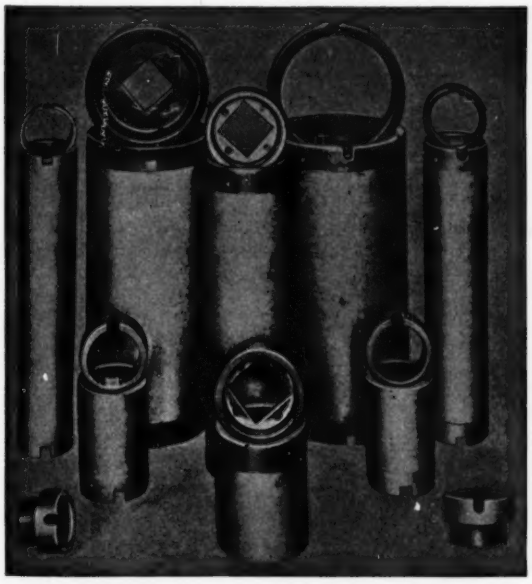


The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO.
4441 Roosevelt Road, Chicago, Illinois

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES



ELIXMAN

C Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

A Long draw protected slot caps of heavy gauge steel in all standard sizes.

P Heavy duty caps with reenforced square hole. This new patented feature of reenforcement gives added strength and durability.

S

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending January 15, 1941

	High	Low	Last
A. P. W.	1¾	1¾	1¾
Armstrong Cork Co.	34⅜	32⅝	33
Celotex Corp.	10	8¼	9¼
Celotex Corp., pf.	73¼	69½	72½
Certain-Teed Products Corp.	5⅜	4⅜	5
Certain-Teed Products Corp., pf.	37½	34	36
Champion Paper & Fibre Co.	20⅜	19½	19½
Champion Paper & Fibre Co., pf.	104½	104	104½
Congoleum-Nairn Co.	17¾	17¼	17½
Container Corp. of America	15⅜	15⅜	15⅜
Continental-Diamond Fibre Co.	7¾	7½	7⅝
Crown-Zellerbach Co.	15⅞	14¾	14¾
Crown-Zellerbach Co., pf.	91½	91	91½
Flintkote Co.	15	14⅜	14⅜
Robert Gair	2⅜	2⅛	2¼
Robert Gair, pf.	17	15¾	15¾
International Paper & Power	15⅛	14¼	14¼
International Paper & Power, pf.	67¼	65	65¼
Johns-Manville Corp.	63½	62	62½
Johns-Manville Corp., pf.	126¼	126¼	126¼
Kimberly Clark Corp.	38	38	38
MacAndrews & Forbes	30¼	29½	30¼
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	28½	27½	28½
Mead Corp.	9	8⅝	9
Mead Corp., pf.	....	....	....
Paraffine Companies, Inc.	37¼	37	37¼
Paraffine Companies, Inc., pf.	106	106	106
Rayonier, Inc.	16¼	15¾	15¾
Rayonier, Inc., pf.	28¾	28½	28¾
Ruberoid Co.	17	16⅞	16⅞
Scott Paper Co.	37½	37	37½
Scott Paper Co., pf.	111⅞	111¾	111⅞
Sutherland Paper Co.	23¼	22½	22½
Union Bag & Paper Corp.	12½	12⅛	12⅛
United Paperboard Co.	3⅜	3¼	3½
U. S. Gypsum Co.	69¼	66	66
U. S. Gypsum Co., pf.	182	182	182

New York Curb Exchange

High, Low and Last for Week Ending January 15, 1941

	High	Low	Last
American Box Board Co.	4¾	4⅝	4⅝
Brown Co., pf.	....	....	....
Great Northern Paper	....	....	....
Hummel-Ross Fibre Corp.	5⅞	5¾	5¾
National Container Corp.	12⅞	12⅜	12⅜
St. Regis Paper Co.	2⅝	2⅜	2⅜
St. Regis Paper Co., pf.	80	79¾	80
Taggart Corp.	3¼	3	3

Provides Retirement Annuity

Ralph A. Powers, president of the Robertson Paper Box Company, Montville Conn., has sent the following announcement to employees: "The company is very pleased to announce that it has signed a retirement annuity contract for the benefit of our employees with the Connecticut General Life Insurance Company. We have been working on this plan for retirement income or pension for many months. It provides for the time when you will reach the age of retirement and is in addition to the Social Security payments you will receive. All employees who have been with the company continuously for five years and are between the ages of 30 and 59 will be eligible to join the plan.

"The company will make certain contributions on account of past service for those employees who would have been eligible if this retirement plan had been in effect in the past. This will cost the employees nothing. Future contributions will be made in equal amounts by the company and by the participating employees based upon each one's earnings.

"Complete details will be available in a few weeks, when all eligible employees will be given an opportunity to join. It is entirely voluntary and joining is not compulsory, but the advantages are such that we believe everyone will want to join."

Plan to Take Over M. & O.

MINNEAPOLIS, Minn., January 10, 1941—Federal Judge Gunnar H. Nordbye confirmed today the trustee's amended plan of reorganization for the bankrupt Minnesota and Ontario Paper Company.

Judge Nordbye set February 28 for consummation of the plan. On that date properties of the concern will be turned over to a new company and securities of the new company will be made available for distribution to the secured and unsecured creditors as outlined in the plan of reorganization.

The plan calls for the exchange of securities and payments to bring about distribution of $9,760,000 in new bonds, 1,344,544 shares of new common stock and $167,868 in cash.

Named directors of the new company are George A. Dobbie, Galt, Ont.; Charles S. Garland, Baltimore, Md.; Frank M. Gordon, Chicago; Serge Semenenko, Boston; Robert S. Waldi, Toronto, and J. B. Faegre, Shirley Ford, C. T. Jaffray and R. H. M. Robinson, all of Minneapolis.

St. Lawrence Calls Stock

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., January 13, 1941—Official advice has been received by the Montreal Stock Exchange of the redemption and cancellation by the St. Lawrence Paper Mills, as at Dec. 31, 1940, of 2,455 shares of the company's preferred stock. This leaves outstanding 139,801 shares of the par value $100 each. It is also announced that the St. Lawrence Corporation has purchased for redemption and cancellation as at the end of 1940, 4,170 shares of Class A preferred stock. This leaves outstanding 293,901 shares of an original issue of 300,000 shares.

International Issues Notes

The International Paper Company, subsidiary of the International Paper and Power Company, has issued $2,909,080 of 3 per cent secured notes in part payment for the stock of the Agar Manufacturing Company, manufacturers of shipping containers. The notes will mature on June 30 and December 31, 1941 to 1944, inclusive.

Paper Box Orders Show Big Increase

CHICAGO, Ill., January 13, 1940—A sensational spurt in orders entered in the East lifted the December bookings of members of the Folding Paper Box Association of America 27.8 %, and the total for the 1940 year, 3.4% above 1939.

Puget Sound Votes Dividend

The Puget Sound Pulp and Timber Company has declared a payment of 50 cents a share on the common stock, payable January 25 to stockholders of record January 17. On September 3 a disbursement of $1 was made.

Indianapolis Dull

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., January 13, 1941 — For the most part there has been some dullness in the wholesale paper market in this territory since the first of the year. Many jobbers attribute this to the fact that buyers have been taking inventory and have not come around to making purchases yet. There is considerable optimism in the local field, however, and business confidently is expected to improve this month.

Considerable satisfaction is being expressed in the various fields concerning the price situation. Even with good business last year, there was no attempt on the part of the trade to boost prices and it is hoped locally that none will be made this year. The one thing the local trade would dislike would be a run-away market at this time. During the entire year, prices have been held firmly and business has responded accordingly.

Demands for newsprint continues good, with lineage up to the average last year and no price changes reported. It is not believed any changes in price will be apparent for the first quarter and the larger papers are buying reserves in good volume.

Building paper and roofing demand continues heavy in spite of the season. Retailers apparently have adequate stocks for all ordinary purposes, but the steady drain on them necessitates repeated buying. There likely will be no really large buying for the spring demand for another month or two unless the winter is exceedingly mild.

Box factories have completed inventory. Warehouse stocks were slightly heavier than a year ago, but the continued demand has warranted this. Prices are held firm and a constantly widening consumer base is being noted, due somewhat to orders from consumers engaged in defense work.

Kraft and tissues continue in good demand.

Fair demand was seen last week for waste paper, though the trade is suffering from seasonal influences and the paying prices are rather soft. Rag demand is following the seasonal trend.

Appleton Embossing Rolls are built in a full selection of fillings to fit any converting or finishing application, for either embossing or backing rolls. Accuracy of machine adjustment and roll construction is essential in the embossing process. Every Appleton Roll is a true precision unit, engineered to installation specifications, to meet definite production requirements.

APPLETON EMBOSSING ROLLS

Chesapeake's Oysters

In 1938 The Chesapeake Corporation which manufactures wood pulp and kraft paper at West Point, Va., asked J. Richards Nelson to make a study of the York River to determine the possibilities for methods of oyster culture that would be practical for the area. It had been alleged that the decline of the oyster industry in the York River had been caused by the effluent from their mill at West Point. They were anxious to investigate this, from the oyster cultivation standpoint, and were frank to state that if they were the cause of the decline they wanted to know it and were ready to correct any trouble that it could be shown that they were causing.

The outcome was that the company purchased the beds and proceeded to enter the oyster business. Scientific methods were applied in the new enterprise which has been rewarded with unusual success. The oysters of the Chesapeake Corporation, marketed under the name "Sea-Rack," "grown in baskets, exposed to sun and air," are said to be the only hand-cultivated oysters in America.

PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 112 January 16, 1941 No. 3

COMING EVENTS IN PAPER INDUSTRY

American Paper and Pulp Association, Sixty-fourth Annual Convention and meeting, Waldorf-Astoria Hotel, New York, February 17-21.

Technical Association of the Pulp and Paper Industry, Convention, Roosevelt Hotel, New York, February 17-20.

Salesmen's Association of the Paper Industry, Annual Meeting and Luncheon, Waldorf-Astoria Hotel, New York, Tuesday, February 18.

National Paper Trade Association of the United States, Convention, Waldorf-Astoria Hotel, New York, February 17-20.

The New York Association of Dealers in Paper Mills' Supplies, Annual Banquet, Commodore Hotel, New York, Tuesday, February 18.

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

American Pulp and Paper Mill Superintendents Association, Twenty-second Annual Convention, Poland Spring House, Poland Spring, Me., June 17-19.

RESEARCH

The contribution of research to industrial progress has so long been accepted as a vital need and the fundamental step for the development of new products and improvement of standard ones, that it is remarkable how slowly this scientific inquiry has been utilized to achieve practical results. Until within a comparatively short period of time the industrial research laboratory was used to a very limited extent. Today major industries attribute a substantial part of their continued, steady growth to the science of experimentation for definite accomplishment. Thus, research has developed and continues to bring forth new products, often from the most inexpensive and abundant natural materials, creates new uses for standard materials and many unique products from substances formerly classified as waste. The paper and pulp industry has been active in employing research to extend the number of its products and find more uses for paper and wood pulp.

Research, always important to industry, is imperative today if America is to prevent the recurrence of economic dislocation such as that which followed 1917-1918, according to Dr. Karl T. Compton, president of the Massachusetts Institute of Technology and chairman of the National Association of Manufacturers' Advisory Committee on Research. "The prosperity the production of armaments seems to produce is only a pseudo-prosperity," said Dr. Compton in a report, "Two Per Cent for Research", published by the N.A.M. Committee on patents and research, of which Robert L. Lund, executive vice-president of the Lambert Pharmacal Company, is chairman, and to which Dr. Compton is adviser. "Guns and planes and tanks, "Dr. Compton continued, "although essential now to national safety, are not wealth-creating machines. National defense orders are only a stimulant injected into industry's bloodstream, and the effects of the stimulant will wear off. We must prepare now for the time when the government ceases to order large quantities of armaments. We must originate now the products and processes which will keep our assembly lines busy after this emergency."

Dr. Compton recommended that all manufacturing companies invest 2 per cent of their gross sales income in research, the average found to prevail in 181 companies studied by the association. "No company is too small to conduct research," said Dr. Compton. "It is not necessary to build a costly laboratory and equip it with expensive scientific instruments to obtain the benefits of industrial research. Research projects today can be cut to fit any man's or any company's budget. Private laboratories and engineering consultant services are to be found throughout the country. The services are available for research assignments of almost any type and almost any size. Many small companies, not now able to support research laboratories, can move in the desired direction by hiring a competent young engineer or scientist and giving him a relatively free hand to study the processes, products and technical problems of the company looking to eventual suggestions for improvement or development. Many companies desiring to have specific subjects studied by trained scientists have provided graduate fellowships in universities or research foundations. Many of these fellowships are financed at figures as low as $750 a year, and such projects can be elaborated to almost any scale by special arrangements."

In pointing out that many services are available, Dr. Compton said that, "Research foundations, usually endowed, but dependent largely upon fees from industry, are conducting an increasing amount of industrial research. Many of the outstanding industrial developments of recent years have come from these research foundations. In a survey just completed, it was found that 35 out of 113 manufacturing trade associations affiliated with the National Association of Manufacturers in the National Industrial Council, conduct research activities. Eleven of them have their own laboratories or cooperate with others supporting laboratories. The average annual research budget of 27 associations reporting specific figures was $36,960. The median budget was $25,000. Two associations spend more than $100,000 a year. Twenty-one of the associations finance re-

search projects for their members at universities, seven at research foundations and three at commercial laboratories. Many of the most successful company research programs have grown from small beginnings."

In asserting that research funds are invested, Dr. Compton said in part: "Income appropriated to research is not spent; it is invested. The question is not whether a company can afford to engage in research but whether it can afford not to, particularly when it is realized that after this emergency has passed, orders for the normal consumer market must be found to replace government orders. This market can be created only by new and better products. If your company does not have a research program, prepare to launch one now. If it has a research program, expand it. You will need the fruits or research, and the nation will need the fruits or research, in the years which lie ahead."

Declaring that research was little developed, Dr. Compton went on to say that, "Research is one of the most valuable but least developed of the nation's resources. Research on one plastic has led to products with 15,000 patented uses. In industrial research and in subsequent production, we observe private enterprise in action. Companies engaging in research have built new markets for themselves and at the same time they have created social benefits and helped to bring progress and prosperity to the nation."

Buy Paper Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., January 15, 1941—For the week ended December 28, the Government purchased $209,715.24 worth of paper and allied products under the Walsh-Healey Act as follows: $12,392.60 worth of paper, waxed and manifold for War, QMC, Brooklyn, from Import Paper Company, Chicago, Ill.; $20,475.00 worth of file folders for Navy, S&A, from Mathers-Lamm Paper Company, Washington, D. C.; $36,600.00 worth of file folders for Navy, S&A, from Chas. G. Stott & Co., Inc., Washington, D. C.; $24,733.80 worth of file folders for Navy, S&A, from Remington Rand, Inc., Washington, D. C.; $63,436.34 worth of target paper for War, Ord. Rock Is. Ill., from Newhouse Paper Company, Moline, Ill.; $21,812.50 worth of mimeograph paper for War, QMC, Brooklyn, from Perkins-Goodwin Company, N. Y. C.; $17,150.00 worth of toilet tissue, paper towels for Veterans Administration, Proc., from Bogart Paper Company, N. Y. C.; and $13,115.00 worth of toilet tissue for Veterans Administration, Proc., from Ashland Paper Mills, Inc., Brooklyn, N. Y.

Norwood Pulp & Machinery Co. Formed

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., January 13, 1941—The Norwood Pulp and Machinery Company has been incorporated with 200 shares of no par value. Incorporators are Theodore P. Steinmetz, Wilson MacDow and E. Jean McCulloch.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	90.2%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	86.2%	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	83.9%	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	86.3%	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	91.8%	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	93.8%	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	87.1%	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	87.2%	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	83.2%	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
Octboer	88.0%	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	86.9%	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	83.8%	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	87.5%	84.9%	72.3%	80.6%	81.3%	70.5%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
November 30	85.9%	December 2	95.1%
December 7	86.9%	December 9	96.6%
December 14	90.8%	December 16	97.7%
December 21	91.1%	December 23	93.9%
Dec. 28 (Holiday Week)	64.9%	December 30	76.2%
*January 4, 1941	86.4%	January 6, 1940	88.0%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Nov. 30, 1940	Dec. 7, 1940	Dec. 14, 1940	Dec. 21, 1940	Dec. 28, 1940	Jan. 4, 1941
0% to 50%	64	45	52	44	94	52
51% to 100%	232	251	244	239	170	168
Total Mills Reporting	296	296	296	283	264	220

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	70%	69%	70%	76%	79%	72%

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%
1940	74%	72%	79%	77%	71%	73%

Week end. Nov. 30, 1940—76%
Week end. Dec. 7, 1940—78%
Week end. Dec. 14, 1940—79%
Week end. Dec. 21, 1940—80%
Week end. Dec. 28, 1940—48%
Week end. Jan. 4, 1941—59%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.
* Preliminary figure.

Gets Digesting Patent

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., January 13, 1941—Announcement is made here that Albert D. Merrill, of this city, has been awarded a patent for his invention of a process and apparatus for digesting fibrous material. It was stated that the process is accomplished by pumping a stream of acid liquor through a circuit from one section to another section of the digester, during the cooking period, and separately pumping a stream of gas from the upper portion of the digester. This forces it into the lower portion of the digester during the cooking period. Then during the latter stages of the treatment, by withdrawing liquor from the bottom and spraying it into the top of the digester, and utilizing said gas circuit to impose a reduced pressure on the digester to increase the evolution of gas from the liquor and to withdraw evolved gas from the digester results are accomplished.

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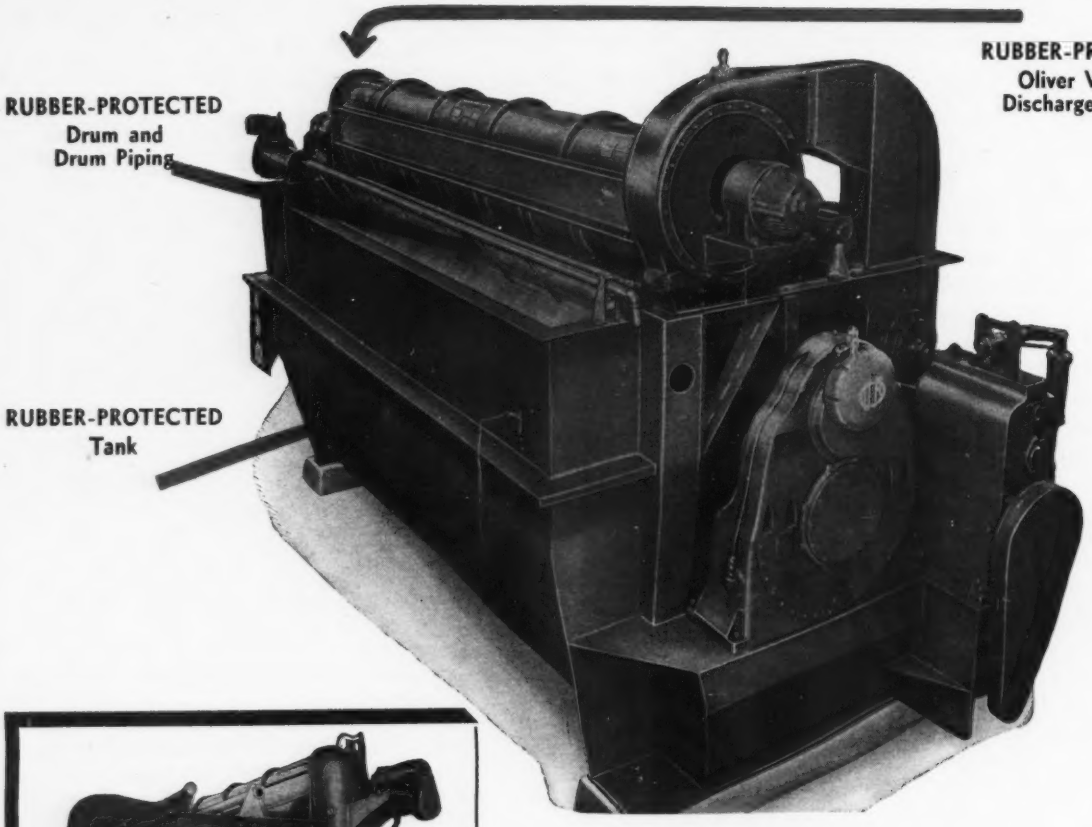

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Chemical Testing Methods Literature Review*

Annual Literature Review of Methods in the Field of the TAPPI Chemical Methods Coordination Committee

By B. L. Browning[1] Chairman

An extended discussion of the cellulose determination and a comparison of seven methods as applied to feedingstuffs have been given by Hallsworth *(1)*. Both the nitric acid method *(2)* and the monoethanolamine method *(3)* have been the subject of further study. The latter method appears to show considerable promise for future development. A TAPPI tentative standard method T 9 m-40 for the determination of holocellulose in wood has been published *(4)*. A modified volumetric method for the determination of alpha-cellulose has been described *(5)*. The method attempts to duplicate conditions of the mercerizing process and the conditions of analysis have been so chosen that variations have a small effect on the result. A comparison of alpha-cellulose methods and suggested new methods have also been published *(6)*.

A number of important papers have been published in the field of lignin chemistry, and it is hoped that this and similar work will lead to more exact definition of the conditions necessary for precise lignin analysis. The influence of tannin in the lignin determination has been investigated by Shrikhande *(7)*. In high tannin materials, successive extraction with 95 per cent alcohol, hot water, and 5 per cent sulphuric acid are recommended. A literature review by Phillips *(8)* includes the isolation and quantitative estimation of lignin.

Investigations of the hemicellulose have been reported in a number of papers, one of which by Phillips *(9)* discusses the quantitative estimation of the hemicellulose constituents. A method for the estimation of starch in plant tissues has been developed *(10)*. TAPPI suggested method T 450 sm-40 for pentosans in paper has been described *(11)* and the results of cooperative tests by several laboratories in the use of the method have been given by Wehmer *(12)*. Reeves and Munro *(13)* have described a new method in which furfural-forming substances are refluxed with an aqueous acid in the presence of a high-boiling, immiscible solvent. The furfural is extracted by the solvent and protected from further action of the acid. A 100 per cent conversion of *d*-xylose to furfural has been obtained. The determination of furfural by a colorimetric method has been described by Stillings and Browning *(14)*. Dunlop and Trimble *(15)* have used the bisulphite-iodine method for the analysis of furfural.

For the evaluation of cellulose preparation, Geiger and Müller *(16)* have outlined micro copper, iodine, and ferrocyanide numbers. Organic acidity has been determined by a new method employing silver acetate *(17)*. The results of four different methods for the determination of organic acidity have been given by Brissaud *(18)*.

TAPPI standard method T 412 m-35 for moisture in paper has been revised *(19)*. Considerations in the testing of wood pulps for moisture have been given by Chapman *(20)*, and in the testing of papers for moisture by Ainslie and Underhay *(21)*. Apparatus for the rapid determination of moisture, accomplished by drying a number of samples simultaneously in a current of warm air and weighing while still in the drying chamber, has been described *(22, 23)*. Mitchell *(24)* has developed a method for the determination of moisture in cellulose by cold extraction with methanol, followed by direct titration of the solvent with Karl Fischer reagent. The method is stated to be very simple and precise.

TAPPI official standard method T 413 m-39 for ash in paper has been revised *(25)*. Cohen and Mackney *(26)* have investigated very carefully a number of methods for the preparation of wood samples for analysis. In woods containing much extraneous material, comminution in a Wiley mill to an "all-through 60-mesh" sample is recommended. Whistler, Martin, and Harris *(27)* have studied the uronic acid determination, and find that accurate results can be obtained only by correction by the carbon dioxide obtained from cellulose. A review of wood chemistry and wood analysis to September, 1939, has been published by Yorston *(28)*.

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* To be presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 17-20, 1941.

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Conditioning Paper for Testing

Revision of TAPPI Standard T 402 m-36

Relative Humidity and Temperature

Whenever standard conditioning is required in a test method, the paper sample shall be conditioned and tested in an atmosphere maintained at 50% relative humidity and 23 deg. C. (73 deg. F.) temperature. A tolerance is permissible (unless for very precise work) of plus or minus 2 in the percentage relative humidity (48 to 52%) and of plus or minus 2 deg. C. (3.5 deg. F.) in temperature. (*See* Note 1.)

Conditioning

Suspend each test specimen of the paper sample so that the conditioning atmosphere will have free access to all surfaces. Means shall be provided for so circulating the air of the conditioning and testing chamber that its humidity and temperature will be uniformly maintained. The conditioning time shall be sufficient for the moisture content of the specimen to attain equilibrium with the conditioning atmosphere, this to be determined by conditioning to constant weight, by accurate weighings at intervals of not less than one half hour. (*See* Notes 2 and 3.)

For work of such precision that the hysteresis in the equilibrium moisture content may lead to an appreciable error, the moisture content equilibrium under standard conditions shall be approached from a drier state by first reducing, if necessary, the moisture content to less than half the value under standard conditions and then conditioning under standard conditions. For that purpose the samples may be dried in a desiccator or other convenient means, provided the temperature does not exceed 60 deg. C. (140 deg. F.).

Determination of Humidity and Temperature

Determine the relative humidity of the conditioning atmosphere by means of either (1) a sling psychrometer, or (2) a stationary type of psychrometer having the air circulated over the thermometer bulbs mechanically. (*See* Note 4.) In both cases the circulation of air around the thermometer bulbs shall be at the rate of not less than 3 meters (10 feet) per second and the exposure not less than 60 seconds before the readings are taken. When the sling type is used, make the readings, especially of the wet bulb, as quickly as possible after bringing it to rest.

The thermometers used for determining humidity and temperature shall be accurately calibrated by comparison with certified standard thermometers and any corrections found necessary applied to the readings. (*See* Note 5.)

Notes

1.—The wet bulb temperature in deg. F., corresponding to a relative humidity of 50%, at a given air temperature, t deg. F. (dry bulb), and a given barometric pressure, B inches of mercury, is given by the equation:

Wet bulb temp., deg. F. (50% R. H.) $= 0.827t + 0.72 - 0.15\ (30\text{-}B)$.

2.—With good circulation a conditioning period of 4 hours is usually sufficient for papers of ordinary weight and composition, but some hard-sized papers, paperboards and water-resistant specialties may require 24 hours or longer.

3.—After the test specimens are conditioned they should be handled as little as possible and not breathed upon.

4.—It is preferable to draw the air over the thermometer bulbs rather than to blow it over them, as in the latter case the heat of the fan causes errors in the readings.

5.—It is recommended that thermometers approaching the following specifications be used: Range 0-50 deg. C. (32-122 deg. F.); graduation, 0.2 deg. C. (0.5 deg. F.). They should be matched to within 0.1 deg. C. (¼ deg. F.) throughout the range used. Under ordinary conditions an error of 1 in the percentage of relative humidity corresponds to an error of approximately ¼ deg. F. in the wet bulb depression.

Improved Nelson Chemical Pump

D. W. Haering & Co., Inc., 2308 S. Winchester avenue, Chicago, Ill., exclusive distributors of the Nelson chemical proportioning pump, announce a number of improvements recently incorporated into Nelson pump design aid construction. The new improvements are based upon data obtained from the many Nelson pumps in continuous operation in the field.

Arrangement of the inlet and outlet valves on the feeding end of the pump have been changed to decrease friction losses and lend a greater volumetric efficiency to the pump. The all-Monel metal discs of the poppet valves now feature diagonal grooves which impart a rotary motion to the disc when in operation. This movement insures a complete reseating of the disc each time the valve closes.

Better lubrication to the pump has been assured by the replacement of a conventional grease fitting with an oil cup, insuring constant lubrication to all moving pump parts.

Nelson pumps are now available in many new sizes and are being constructed from many alloys and metals in addition to brass. Pumps of special alloy construction are being supplied for corrosive and other special services.

The Relation of the Strength Properties of Multiply Paperboard to the Bonding between Plies

By Duncan S. Brown[1]

Abstract

Sheets of paperboard were made in the laboratory. Variations in the treatment of the stock and the preparation of the sheets were studied in connection with their effect on the bonding between plies and the overall strength of the sheets. A comparison between a board made in the laboratory and one made on a commercial cylinder machine shows that the laboratory procedure will produce sheets that can be readily related in strength values to machine made sheets. Tests for measuring the bonding between plies and fibers have been developed and evaluated.

From the results obtained in the investigation the following conclusions have been drawn: (a) The mechanism by which plies in a multiply sheet are bonded together is the same as that by which the fibers inside the plies are bonded together.

(b) There is a definite relation between the strength of a multiply sheet and the bonding between plies. The relation is the same as that between the bonding and strength of a single sheet; in a multiply sheet the two relations are inseparable.

(c) Under certain conditions it is possible for the strength of the bond between the plies to be greater than the fiber strength.

(d) The strength of a multiply sheet is greater than the combined strengths of the plies in the sheet, indicating that the strength of the multiply sheet is dependent on the strength of the bonding between plies.

(e) The number of plies used to make multiply sheets of the same weight and caliper affects the strength of the sheets. There is an optimum number of plies for a given stock and sheet weight.

(f) The bonding between plies is dependent on the position of the interface in relation to the remainder of the sheet.

(g) The magnitude of the couching pressure affects the bonding between plies and the strength of the multiply sheet but not as much as the magnitude of the final pressure. Calendering a sheet, whether it be a single sheet or a multiply sheet, reduces the strength and the bonding of the sheet, and especially the stiffness.

(h) The amount of drying given sheets does not appreciably affect their strength, provided the sheets are all brought to the same moisture content before testing.

(i) The amount of beating given a stock is the most important factor in determining the bonding between plies and the relationship between fiber-to-fiber forces and the fiber strength.

A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., June, 1939. This work was carried out under the guidance of S. D. Wells.

[1] Member TAPPI, Technical Supervisor, The Gardner-Richardson Co., Middletown, Ohio.

Of the three primary strengths that are the components of the overall strength of a multiply board, those in common with single sheets, namely the strength of the fibers and the bonding between fibers, have received a considerable amount of study, whereas bonding between plies has received almost none at all. Some work has been done on this bonding, but no one has seemed to recognize the bonding between plies as a primary strength in the overall strength of the multiply sheet. No attempt has been made to correlate it with the strength tests.

However, Campbell *(6)* as well as Halladay and Ulm *(17)* have pointed out the necessity of splitting the plies apart in order to secure a good bend. When two or more mats of wet fibers are couched together with the aid of a relatively low pressure, subsequently pressed at a relatively high pressure, and then dried, what causes these sheets to stick together? The answer to this specific question has not been reported in the literature, but the closely related question of what causes the bonding between fibers in a single sheet has been studied by several investigators. The work of Campbell *(7, 8)* is probably the best known.

Sutermeister and Porter *(21)* reported the use of a test to measure the bonding inside a single sheet. They measured the force to pull a single sheet apart, when the force was applied normal to the surface of the sheet. At the same time, Abrams *(1)* introduced a similar test and used it to measure the bonding between plies in commercial board. Bekk *(3, 4)* developed a commercial testing instrument to measure the force required to split the sheet, when the force is applied at an angle to the sheet. With this instrument, he found that supercalendered sheets had surprisingly low pick values because of "the grinding action of the calender rolls." This commercial instrument is quite a contrast to the old method of picking a sheet with a moistened thumb *(16, 20)* which is fairly satisfactory as a qualitative measure. Another common method of measuring the resistance of the sheet to picking is the use of standard waxes *(20)*.

In contrast to the tests in which the bonding between plies is measured normal to the sheet, there are tests that measure the force required to tear plies apart. Courtney and Wakefield *(11)* have analyzed the problems in connection with this type of measurement and developed a suitable tester, which Forman *(15)* modified for the purpose of measuring the bonding strength of different adhesives. Doughty and Baird *(14)* were the first to study any of the factors affecting the bonding between plies. They studied the effect of wet-pressing on the bonding in 2-ply sheets. From their work, they concluded that the resistance of a single sheet to a tearing-type split was independent of the amount of wet-pressing, that the bonding between plies is greatest when the couching pressure is lowest and the final pressure is highest, and that to

secure a good bonding between plies the final pressure must be higher than the couching pressure.

Brax *(5)*, in a rather thorough investigation, found that the degree of beating and the position of the plies relative to each other are important in determining the bonding betwen two plies in duplex sheets.

Jeitteles *(19)* showed that the greater the number of plies used to make a given weight of laminated board, the greater the strength of the board.

Experimental Procedure

Preparation of Stock

Several different kinds of stock were used, but the larger portion of the experimental work was carried out with unbleached sulphite pulp. All the stocks were prepared by beating in the 1½-lb. standard beater, the extent to which they were beaten being determined with the Schopper-Riegler freeness tester at 20 deg. C. The stocks that were prepared in the laboratory were unbleached sulphite, news-unbleached sulphite (made by beating a mixture of old newspapers and 10 to 20 per cent unbleached sulphite), bleached sulphite, unbleached kraft, and groundwood-sulphite. In addition to these, commercially prepared unbleached kraft, chip, and kraft-sulphite stocks were taken from the line in a board mill to be used in the experiment on the comparison of handmade and machinemade board and in certain other experiments.

Sheetmaking

The Noble and Wood sheetmaking apparatus *(10)* was used for the preparation of all handsheets, because it allows sheets to be made under conditions which resemble more closely machine operations, and because preliminary work showed that sheets could be readily duplicated on it. Usually five sheets were made for each set of experimental conditions. The procedures given by Coghill *(10)* were not followed exactly, but they were practically the same with the exceptions that, with very slow stocks, less water than normal was used in order to secure drainage in a reasonable time, and that heavy sheets were not dried in contact with the wire upon which they were formed.

The sheet was couched from the wire to a felt by passing the felt, the sheet, and the wire between weighted press rolls. A multiply sheet was built up by couching one sheet upon the other until the required number of plies was obtained. A narrow strip of tissue was inserted along the back edge of the sheet between the plies that were to be split in the testing procedure. After the required number of plies had been built up, the multiply sheet was given a final pass through the press rolls. The amount of pressure designated in the following experiments is expressed in pounds per linear inch *(10)*. The sheets were dried as uniformly as possible at a temperature controlled between 102 and 105 deg. C.

In certain experiments the sheets were calendered by the use of Noble and Wood press rolls by reducing the clearance to zero. Both the number of passes at a given pressure and the pressure for a given number of passes were varied.

Testing the Sheets

All sheets were seasoned at 70 deg. F. and 65 per cent relative humidity for at least 16 hr., and tested under these conditions, unless otherwise stated. The physical tests carried out on most of the sheets and the units in which the results of these tests are reported were as follows:

Weight, pounds per thousand square feet
Caliper, points or thousandths of an inch
Burst, (Mullen), points per hundred pounds per thousand square feet
Tear, tear factor
Tensile, pounds per hundred pounds per thousand square feet
Stretch, per cent
Suvant stiffness, units per hundred pounds per thousand square feet
Riehle stiffness, pounds per hundred pounds per thousand square feet
M.I.T. fold, number of double folds
Tear split, grams force per area tested
Forman test, grams force per strip tested
Tensile split, grams force per 15 mm. wide strip
Perpendicular bonding, pounds per square inch

The tests for basis weight, caliper, bursting strength, and tearing strength on all sheets were carried out according to TAPPI Standard Methods. However, in the tear test, it was occasionally necessary to increase the capacity of the tester by the use of the supplementary weight provided with it, as described by Carson and Snyder *(9)*. Tensile and strength tests were carried out on the Amthor tensile tester, which is similar to the Schopper tensile tester, the major difference being the higher rate of loading used with the Amthor tester. The measurement of stiffness was made with the Suvant tester (Smith-Taber) *(2, 18)*. Riehle stiffness is different from that measured by the Suvant instrument in that it measures the resistance of the sheet to crushing rather than to bending. This test was carried out on strips ½ in. wide and 2 in. long, with the crushing force being applied against the long edge of the sheet held in the form of a cylinder. The M.I.T. folding endurance was measured according to Institute Method 513B.

The tests in which the bonding between plies was measured by tearing the sheets apart in the splitting operation have been designated as tearing-type bonding tests. Three tests of this nature were carried out in evaluating the bonding between plies in the present investigation. The tester designed by Courtney and Wakefield *(11)* and modified by Forman *(15)* was used in part of the investigation. On the whole, the tester worked well mechanically and gave moderately satisfactory results. It was found that the initial splitting value was not reproducible because of variations in the bonding brought about by the inserted strip used to start the split. In any test measuring the tearing split, the length of the split must be sufficient to make negligible the effect of the inserted strip or the starting of the split. The maximum and average forces obtained from the curve which results with the Forman tester are the better means of measuring the bonding with this instrument. However, the evaluation of the results is time-consuming, especially since a large number of tests are required to obtain a good average value. On account of this difficulty, a Schopper tensile tester, which would measure a force between zero and 1000 g., was used to measure the tensile force required to tear the sheets apart. The split was started by means of the inserted strip, the two sides of the strips fastened into the clamps and the tensile force applied. The initial force, as well as the maximum force required to split the sheet, could be determined. However, this test was not very satisfactory, principally because it was not sensitive enough and the variations for any one sheet were quite large.

A method of measuring the integrated force required to split a definite area of the sheet with the Elmendorf tear tester was also used. Strips one inch wide and with a splitting length of up to 3½ in. can be used. After the split was started, the heavy

side of the sheet was clamped in the front jaw of the tester, with the long axis of the sheet perpendicular to the plane of motion of the sector, i.e., the sheet extended to the front. The other side of the sheet was held in the fingers, or a suitable clamp, the pendulum released, and the sheet split apart. Due to the simplicity of the test and the possibility of securing consistent results with it, this test is recommended for all bonding measurements when it is desired to measure the bonding force between any two given plies and not the weakest force in the sheet.

A perpendicular or normal bonding test similar to that used by Abrams was employed in the present investigation to measure the force required to split the sheet (either a solid or a multiply sheet) when the force is applied normal to the surface. This test measures the weakest point in the sheet. The adhesive used in this test depended on the nature of the sheet; if it were a well-beaten sheet, animal glue was used to obtain a strong enough bond between the sheet and the block. Silicate was generally used, however, because it is sufficiently adhesive to be suitable for probably all commercial boards and does not penetrate sheets of the porosity encountered in this study.

Presentation and Discussion of Results

Duplication of Character of Handsheets

In any study requiring the use of handsheets, it is necessary that three conditions be fulfilled: different handsheets made under the same conditions must possess the same properties, those made under different conditions must be different, and finally they must have a constant relation to machinemade sheets. In the present study, the primary requirement is that the properties of the handsheets be reproducible, but the approximate relation between the handsheets and machinemade sheets should also be known. It was found that the method of sheetmaking used was quite suitable for preparing handsheets that fulfilled these conditions.

The reproducibility of the results, as obtained on a set of five 2-ply handsheets made from unbleached sulphite can be seen from the following average percentage deviation from the mean for different tests:

(a) Burst	± 4.1%
(b) Tear	± 4.3%
(c) Riehle	± 6.6%
(d) Tensile	± 4.5%
(e) Stretch	±12.5%
(f) Suvant	± 3.0%
(g) Tearing split	± 7.3%
(h) Perpendicular bonding	±27.4%

The large variation in the perpendicular bonding test is due more to the nature of the sheet than to the test, as will be shown later in connection with the use of this test on machinemade board.

Relation Between Handmade and Machinemade Board

In order to establish a basis of comparison between handsheets and machinemade sheets, 6-ply handsheets were made from the same stock that was being run on a 6-cylinder commercial board machine making 85-lb. kraft-lined chipboard. Table I shows the relation between the handmade and machinemade sheets.

TABLE I.—RELATION BETWEEN HANDMADE AND MACHINEMADE BOARD

Test	Handmade	Machinemade
Weight	88.7	85.0
Caliper	29.0	28.5
Burst	179.0	161.0
Tear	9.7	6.4*
M.I.T. fold	664.0	240.0**
Riehle	40.7	49.6**
Tensile	53.6	56.8**
Tear split	18.4	34.4**
Perpendicular bonding	21.4	32.8

* In-direction only.
** Average of the machine and cross direction.

The data contained in this table show that the strength of the handsheets made in the laboratory approximates that of a machinemade sheet.

Evaluation of Bonding Tests

Changes in Bonding Between Plies Produced by Pressing

The sensitivity of the various tests for measuring the bonding between plies was studied by means of a series of unbleached sulphite handsheets made from stock with a freeness of 595 and wet-pressed with different amounts of final pressure. The results obtained with the different tests on this series of handsheets are shown in Fig. 1.

The tear split and the perpendicular bonding tests showed good agreement in measuring the bonding force with changes in the amount of pressing. The tearing-type splitting test (using the Forman tester) indicated a maximum in the bonding between two plies, occurring at a relatively low pressing force—namely, about 40 pounds per inch. It was at about this pressure that the perpendicular bonding and the tear split tests began to flatten off with respect to increasing pressing force. However, the latter tests did not show the maximum in the relation between the bonding force and the pressing that the Forman tests did. It is believed that the maximum obtained with the Forman tester resulted from some characteristic of the instrument itself; perhaps the angle which the sheet assumes as it is being torn apart causes the maximum effect.

Deviations in Individual Test Results for Handsheets

The average percentage deviation of the bonding tests from the mean value was greater the smaller the value, due to the lack of sensitivity of some of the instruments for low forces. Table II shows the percentage deviation from the mean which may be expected for each of the bonding tests employed, both for the whole range of values covered and for the range in which most of the results fall.

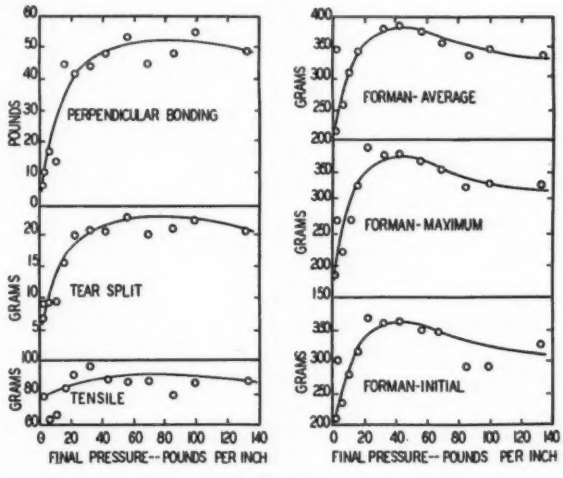

FIG. 1.
Effect of Final Pressing on Bonding

TABLE II.—PERCENTAGE DEVIATION OF BONDING TESTS—HANDMADE BOARD

	Entire range %	Critical range %
Tear tester	13.2	7.5
Tensile tester		
Initial	19.7	13.7
Maximum	16.9	12.0
Forman tester		
Initial	14.6	12.6
Maximum	12.0	9.3
Average	12.9	11.6
Perpendicular bonding	25.4	13.6

These results were obtained using handsheets as the material being tested. The results of the same tests, carried out on the commercial kraft-lined chipboard mentioned previously, are shown in Table III.

TABLE III.—PERCENTAGE DEVIATION OF BONDING TESTS—MACHINEMADE BOARD

	Mean	Deviation %
Tear tester	20.5	15.0
Tensile tester		
Initial	50.0	29.0
Maximum	130.0	11.6
Forman tester		
Initial	505.0	22.1
Maximum	847.0	11.5
Average	712.0	9.8
Perpendicular bonding	33.8	8.0

In addition to these tests, a series of 40 perpendicular bonding tests was carried out on the kraft-lined chipboard, the samples being as uniform as possible, for the purpose of determining the most suitable number of tests in order to secure reasonable accuracy. The results obtained indicated that the average deviation from the mean which might be expected for a machinemade board of this type is as follows: (a) 5 tests, 3.7 per cent; (b) 10 tests, 2.5 per cent; (c) 20 tests, 0.0 per cent.

Effect of Adhesive on the Perpendicular Bonding Test

The effect of the adhesive on the results obtained using the perpendicular bonding test was determined for thin and thick 2-ply handsheets made from the same unbleached sulphite stock and in the same manner, as well as for the commercial kraft-lined chipboard. The results obtained with the following adhesives are reported in Table IV: (a) Animal glue 27 per cent in water; (b) 40% soluion of sodium silicate; (c) Dennison no. 20 pick test wax; (d) Carnauba-beeswax, 2 to 1.

TABLE IV.—EFFECT OF ADHESIVE ON PERPENDICULAR BONDING TESTS

	Handsheets		
Adhesive	Heavy	Light	Machinesheets
Glue (10 min.)	36.8	...	...
Glue (20 hr.)	93.7	51.9	28.8
Silicate (10 min.)	39.7	...	...
Silicate (20 hr.)	72.4	67.9	31.2
Dennison wax	85.8	85.1	...
Formulated wax	...	...	34.8

The nature of the adhesive and the method of its application have a marked effect on the perpendicular bonding test. However, differences are not due so much to the adhesive material itself as to the medium containing the adhesive, e.g., water, and the method of preparing the cemented sheets for testing. The time of seasoning after the sheets are cemented between the blocks with an adhesive containing water plays one of the most important roles in the test, for the bonding between plies is decreased when the moisture content of the sheet is increased.

One point to be considered is that all conditions being equal, two sheets of the same material should stick together with the same force whether the sheets are thick or thin, provided they are put together the same way. The data contained in Table IV indicate this to be the most probable condition, for the bonding obtained with both silicate and the Dennison wax as adhesives was approximately the same for both the thick and thin sheets. On the other hand, the values obtained using the two different adhesives were not the same, but this difference is reasonable on the basis of the moisture contents of the sheets at the time of testing, a slight amount of excess water still being present in the silicate-cemented sheet after seasoning.

It is possible that, when glue is used as the adhesive in testing the bonding in a thin porous sheet, it may penetrate through the sheet, bridging over the space between the blocks. This is shown in Table V.

TABLE V.—EFFECT OF ADHESIVE ON PERPENDICULAR BONDING TESTS FOR THIN SINGLE SHEETS

	Force	
Freeness	Glue	Silicate
850	200+	7.7
775	166+	45.3
550	79.4	81.3
415	68.5	77.6
360	68.2	85.7
285	61.6	87.4
190	68.4	90.0

Under the conditions that existed in this series of handsheets, the glue had apparently penetrated all the way through the thin porous sheets made from the less thoroughly beaten stock, with the result that the effect is very much as though the sheets were not there at all, while the sheets made from the more thoroughly beaten stock are apparently dense enough to prevent the penetration of the glue. The sheets tested were 40-lb. sheets of bleached sulphite (24 x 36 —500). Since it is well known that unbeaten stock forms sheets that have a low fiber-to-fiber bonding force, it is obvious that the results obtained with the silicate are the correct ones, and that the silicate has not penetrated even the most porous sheet, whereas the results obtained with glue as the adhesive are correct only in the case of the denser sheets through which the glue did not penetrate.

A hard nonpenetrating wax would be more suitable than either silicate or glue as the adhesive in the perpendicular bonding test if it could be evenly applied, because it would not introduce any water into the sheet. Application is a real difficulty, however, and asphalt of proper consistency has been recommended. Where silicate is used adequate seasoning must be allowed before testing.

Strength of Multiply Sheets vs. Strength of Plies

In order to determine whether the bond between plies in a multiply sheet plays any part in the strength tests carried out on the sheet, the relation between the strength of multiply board and the strength of the individual plies that make up that board was determined. Multiply sheets of unbleached sulphite of about the same weight, but made from different numbers of plies, were made and tested for strength. Single plies, the same weight as the plies in the various multiply sheets, were made and tested as units. In the case of the 7-ply sheets, seven of the single sheets were tested together as a unit, i.e., they represented a multiply sheet that had no bonding between plies.

The stock used in the series of tests, the results of which are presented in Table VI, was unbleached sulphite with a freeness of 620 cc. The values reported in the table have been converted to a unit basis weight in order to be comparable. The basis weight of the

multiply sheets was approximately 100 lb. per thousand sq. ft.

TABLE VI.—STRENGTH OF MULTIPLY SHEETS AS RELATED TO STRENGTH OF PLIES IN THE SHEET

Plies	Burst	Tear	Riehle	Suvant	Tensile	Stretch	Tear split	Perpendicular bonding
1	217	9.8	50.6	153.5	59.6	5.9	...	55.6
2	290	9.9	58.8	147.1	73.1	6.9	26.9	66.7
S	256	7.9	53.3	55.1	77.5	3.5	...	68.3
3	321	9.9	56.0	146.0	84.5	7.3	57.0	33.8
S	270	7.2	47.6	24.4	93.9	2.9	...	70.7
4	330	10.3	54.0	145.0	85.7	6.9	46.1	42.0
S	316	6.3	40.8	....	96.8	3.3	...	62.7
5	328	10.3	60.4	141.3	82.6	7.3	44.8	40.4
S	290	6.3	37.7	25.2	101.9	2.9	...	68.1
6	337	10.3	56.6	142.7	83.6	7.4	37.8	23.8
S	280	5.3	34.5	12.7	87.0	2.7	...	61.0
7	326	10.6	57.5	147.6	82.3	6.6	35.7	31.6
S	275	5.3	31.6	10.9	77.2	2.3	...	58.4
7xS	292	5.5	34.0	10.8	85.0	4.2	00.0	00.0
9	328	10.5	56.4	137.9	83.9	6.7	22.2	36.1
S	270	5.5	24.1	8.8	95.0	2.4	...	70.1

S = single sheet with the same weight as individual plies in the multiply sheet preceding
7xS = seven single sheets tested as a unit

From these data it appears that an appreciable part of the strength of a multiply sheet comes from the bonding between plies, probably the result of the greater stiffness that exists for plies bonded together and the consequent transfer of the stresses throughout the mass. The effect of the weight itself does not cause the increased strength in the multiply sheets; otherwise, when seven single sheets were tested as a unit, the results obtained would be the same as those obtained with a 7-ply sheet.

Effect of the Number of Plies on the Strength and Bonding of a Sheet of Multiply Paperboard

The data in Table VI also show the effect of changing the number of plies used to make a given weight of multiply board on the strength and bonding of the board. Figure 2 shows graphically the manner in which the stiffness, bursting, tearing, and tensile strengths vary with the number of plies in this case, while Fig. 3 shows how the bursting strength varies for other kinds of stock.

Of the several stocks used to determine the effect of the number of plies on the bursting strength, almost all show a point between three and five plies where the burst reaches a maximum. The location of this maximum will vary with the overall weight of the multiply board and the nature of the stock being used. Since all the sheets used in this study were made in

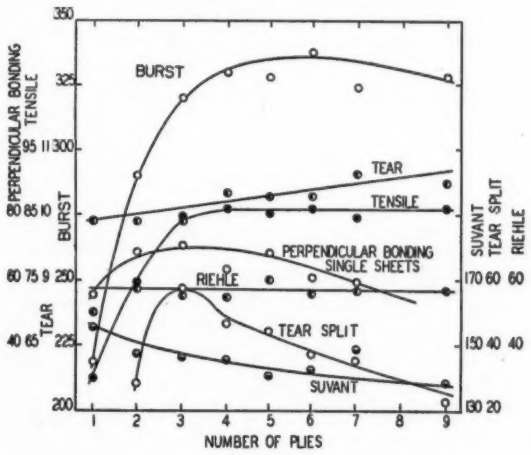

FIG. 2.
Effect of the Number of Plies on Strength of Unbleached Sulphite

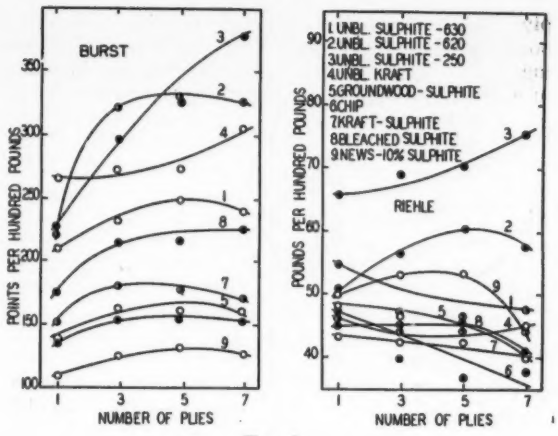

FIG. 3.
Effect of the Number of Plies on Strength

the sheet mold, using the same amount of water for each ply (the very slow unbleached sulphite was an exception), the greater the number of plies the less the amount of stock per ply and, hence, the less the consistency. Obviously the sheets made at lower consistency have the better formation.

As the number of plies is increased, however, a ply weight will soon be reached beyond which any decrease in weight will produce little increase in the quality of the formation. This means that if the formation were the only factor that governed the burst test in this case, it would be expected that the bursting strength would increase rapidly at first, but the rate of increase would then become smaller and at a certain number of plies would become almost constant. On the other hand, each time another ply is used in making up a sheet of multiply board, another point of potential weakness is introduced at the boundary between plies. Whether such weakness will actually result from the use of an additional ply depends on the nature of the stock and the number of plies already present, but the primary consideration is whether the removal of water from the sheet during pressing and drying becomes more difficult so that a reduction in the bonding force between one or more plies will result.

The two stocks (Fig. 3) that are the exceptions to the maximum-in-burst condition help substantiate the postulation that better formation causes the burst to increase to a maximum as the number of plies is increased. The unbleached kraft stock was very free (freeness 810 cc.) so that, even when seven plies were used to make the multiply sheet, the increasing quality of the formation was still the controlling factor. The other extreme of beating is represented by the unbleached sulphite stock with a freeness of 250 cc. It was just as hard to form into a sheet as the very free stock, especially since less water was used in its formation.

The bonding results obtained with both the tearing-type splitting test and the perpendicular bonding test require some explanation and clarification. The results presented in Table VI for the latter type of test show the force required to split the sheet at the weakest point in the sheet which, in all cases, was at one of the boundaries between plies. The data serve to illustrate the introduction of weakness into the sheet as the number of plies is increased. In the 2-

ply sheet, where water removal need not disturb the bonding between plies, the bonding force is high, being very nearly that which existed between the fiber in the individual plies. As more plies were introduced, the water removal caused a disturbance of the bond between plies, so that the bonding at the weakest ply interface was not nearly as great as that between the fiber in the plies, although it may have been so at other interfaces in the sheet.

Instead of measuring the weakest point in the sheet, the tearing-type test measured the bonding between the top two plies in each case. This ply interface should not be affected greatly by the water removal during the final pressing. Why such a low force is required for the splitting of the 2-ply sheet, especially since the perpendicular bonding value is high, cannot be explained. If it is assumed that the top two plies are bonded together with the same force for any number of plies in the sheet, the decreasing force required to split these plies by the tearing-split test in going from the 3- to the 9-ply sheet could be explained on the basis of the decreasing resistance of the top liner to bending.

The tear values obtained on the tear tester showed a tendency to increase as the number of plies was increased. This may be attributed to increased spliting inside the sheet during the tear, when there are present more interfaces that can be split apart as they are torn across. However, on the whole, the tearing strength of the multiply sheet is independent of the number of plies.

It may be said that the number of plies used in making a multiply sheet affects the strength of the board. However, multiply paperboard possesses one fundamental difference from laminated material. In the latter case, the lamination is carried out by cementing together sheets that possess approximately the same strength per unit weight irrespective of thickness, while the adhesive used is different from the sheets themselves. In the case of multiply board, conditions of forming the plies that make up the board are such that the nature of the plies changes as the thickness changes, due to changes in the quality of formation of the plies. At the same time, the material which cements the multiply sheet together is a part of the ply itself. In laminated board, the strength of the bond is usually greater than the strength of the ply, whereas this is the rare case in multiply sheets. Therefore, it is possible to have a point of maximum strength for each quality of stock and weight of sheet.

Bonding Between Plies as a Function of Position In the Sheet

A study has been made of the bonding forces at all the different ply interfaces in various multiply sheets. The results obtained on one set of sheets are reported in Table VII, where *A* represents 7-ply sheets of unbleached sulphite with a freeness of 620 cc., *B* 7-ply sheets of unbleached sulphite with a freeness of 530 cc., *C* 7-ply sheets of news—20 per cent unbleached sulphite with a freeness of 310 cc., and *D* 7-ply sheets, the top two plies of unbleached sulphite with a freeness of 530 cc. and the bottom five plies of news-unbleached sulphite with a freeness of 310 cc.

TABLE VII.—BONDING BETWEEN THE DIFFERENT PLIES IN A 7-PLY SHEET

	Tear split between plies						Perpendicular bonding	
Sheet	1—2	2—3	3—4	4—5	5—6	6—7	Force	Position
A	33.1	36.6	28.0	23.9	46.9	33.7	...	....
B	38.0	48.9	34.7	28.2	43.8	38.1	73.1	2—3
C	T	T	18.7	18.2	T	T	35.9	2—3
D	35.0	42.6	19.0	13.4	36.6	T	48.4	3—4

T—Ply split rather than interface

From these data it is apparent that the bonding force between plies is dependent on position of the interface in question with respect to the top and bottom of the sheet. Sufficient data were not obtained to be able to say that, for every sheet with a given number of plies, there is a certain position which will be the weakest, but this seems to be indicated by the tear-split data.

Bonding of 3-Ply Sheets

Table VIII shows the results obtained on 3-ply sheets of unbleached sulphite when two plies were made from two stocks of constant freeness and the third was varied with respect to freeness and position in relation to top and bottom and the two constant plies.

TABLE VIII.—BONDING BETWEEN PLIES AS A FUNCTION OF POSITION AND FREENESS

Freeness of plies, cc.			Tear split		Perpendicular bonding	
Top	Middle	Back	Top-Middle	Middle-Back	Force	Position of Split
775	380	830	27.8	19.1	28.5	M-B
775	830	380	17.9	10.1	12.1	M-B
830	775	380	17.3	12.4	21.3	T-M-B
830	380	775	18.2	23.4	21.5	T-M
380	830	775	10.8	11.3	11.7	M-B
380	775	830	21.3	11.0	24.5	M-B
775	380	690	32.8	32.5	36.5	T-M
775	690	380	29.5	21.0	38.4	T-M
690	775	380	26.7	15.1	34.8	M-B
690	380	775	38.9	25.2	43.7	M-B
380	690	775	32.4	13.4	47.3	B
380	775	690	23.1	17.8	28.6	M-B
775	380	550	34.2	22.2	46.5	T-M
775	550	380	31.3	22.8	40.4	T-M
550	775	380	25.5	18.9	32.6	M-B
550	380	775	47.7	27.3	52.0	M-B
380	550	775	X	31.5	44.0	B
380	775	550	20.0	16.1	29.8	M-B
775	380	415	36.3	30.6	38.5	T-M
775	415	380	31.6	34.9	33.4	T-M
415	775	380	20.2	16.9	34.6	M-B
415	380	775	X	32.0	48.3	B
380	415	775	X	33.7	48.1	B
380	775	415	19.5	17.0	37.8	M-B
775	380	245	34.5	X	42.6	T-M
775	245	380	36.8	37.9	43.5	T
245	775	380	17.6	16.6	36.2	M-B
245	380	775	X	34.8	49.0	B
380	245	775	X	36.7	48.3	B
380	775	245	20.5	18.8	38.3	M-B

X—Ply tore instead of bond
T—Top ply
M—Middle ply
B—Back ply

	Weight	Capiler	Apparent density
First group	56.3	14.4	3.91
Second group	57.1	13.5	4.25
Third group	56.2	13.3	4.25
Fourth group	58.5	13.9	4.21
Fifth group	57.9	13.5	4.30

In general, it may be said that for any given stock or stocks, the bonding between two plies is dependent on their position relative to each other and with respect to the top and bottom of the sheet. The bonding is greater when the interface is between the top and middle plies in a 3-ply sheet than when it is between the middle and bottom plies. The bonding is much greater if the freer sheet is on the outside of the interface. As the amount of beating of one ply in a 3-ply sheet is increased (the other two being kept constant), the bonding between those plies increases until either the fibers in the freer sheet are bonded together with a force that is less than that at the ply interface, or until the variable ply has been beaten to

such an extent that the removal of water across the interface in question is so difficult that the bonding between plies is reduced by its removal.

Mechanisms Controlling the Bonding Between Plies

Many of the changes which take place at the interface when the freeness of one ply is varied are a result of the differences in the amount and rate of water removal during drying and especially during pressing. The ease with which the water contained in the plies can be removed across the interface determines the final bonding. The physical mechanism of this action is easily understood. However, there are conditions under which it is not easy to see how water removal alone can change the bonding force in the manner observed. Therefore, at least one other factor must help control the bonding under these conditions, and the two factors are such that they oppose each other.

Starting with Campbell's statement *(7, 8)* that greater bonding between fibers on beating results only because of the increased surface area per unit weight, a mechanism which is general for the bonding between plies may be postulated. The action which causes the bonding between plies to vary is the change in the amount of actual contact area between the plies. Any action that will decrease the actual area of contact will decrease the bonding between plies; any action that will increase the amount of contact will increase the bonding between plies. In this instance, the removal of water across the interface causes a reduction in the number of contacts and therefore in the bonding between plies, whereas the action which causes increased bonding to take place is dependent on the amount of water present at the interface at the time of pressing the sheet.

The more water there is present in the sheet when the plies are being pressed together, the greater will be the freedom of motion of the fibers on the surface at the interface during pressing. The effect may be compared to the effect of using more water in forming a single sheet; the formation will be better, the surface of the sheet will be smoother and more compact, and the fibers in the sheet will tend to contact each other more completely, all of which results in a tighter sheet. Such a condition may be thought of as existing at the interface during pressing. The initial couching pressure used is not sufficient to cause many contacts between the fibers of the opposite surfaces. It is the final pressing of multiply sheets that causes the real bonding between plies to take place. This is shown later in the effect of pressing on bonding. The drying of the fibers that are in contact as a result of the pressing completes the cementing of the fibers and plies together. However, too rapid a drying action may cause this bonding to be reduced because pockets of steam may form under certain conditions.

As the sheet goes through the press rolls the fibers may be said to flow at the interface; the more water present, the more the fibers will move to fill in the interfaces between the two surfaces, thus producing a more nearly continuous structure. The higher the pressure used, the more the fibers will be pressed together in intimate contact, with the result that the bonding force is greater due to a greater area of actual contact.

To illustrate the two mechanisms that control the bonding between plies, consider the results obtained for the case of the interface between the sheets with freenesses of 775 and 380 cc. when this interface is between the top and middle plies with the freer stock on the top of the sheet. The nature of the stocks at the interface is always the same, but the freeness of the stock that is used for the back liner is changed. This means that, after the couching operation, there is a greater amount of water present at the interface during pressing when the back liner is made from slower stock, due to the greater water-holding capacity of the more thoroughly beaten stock for the same conditions of pressing. However, the disrupting force of the water being moved across the interface during pressing is active and when the combination of the bottom and middle plies is such that it is very difficult for the water to pass through them in the pressing operation, most of it will go across the top interface. Under this condition, the reduction of the contact area by the water passage is greater than the increase in the amount of contact that is permitted by the greater amount of water present, and the bonding at the interface goes through a maximum at a point approximately where the freeness of the third ply decreases below that of the middle ply.

Curling

The positions at which plies of different freenesses are placed greatly affect the amount of curl which a sheet will exhibit. The curl is always toward the ply made from the slower stock, and when this stock is greatly different from the others, the sheet may curl until it is in the form of a cylinder. If the ply with the greatest shrinkage is in the center of the sheet, it will tend to remain flat. It is usually believed that the curling of commercial board is caused primarily by the moisture content of the board across its surface. This may be the case if it is considered that the amount of hydration given a stock by beating helps to control the hygroscopic nature of the sheet. However, the primary factor that causes a board to curl is the amount of shrinkage which each ply undergoes when the sheet is dried. If all the plies shrink the same amount the sheet will not curl.

Effect of Couching Pressure on Strength Properties and the Bonding Between Plies

Several different stocks were used to study the effect of couching pressure on the bonding between

TABLE IX.—EFFECT OF COUCHING PRESSURE ON STRENGTH OF 6-PLY SHEETS OF UNBLEACHED KRAFT—FREENESS 770 CC.

Couching pressure	% Dry, couched	Appar. density	Burst	Tear	Riehle	Suvant	Tensile
10.0	35.4	4.55	387	9.6	72.0	201	91.1
13.3	33.9	4.41	391	10.9	79.4	206	91.9
23.3	36.4	4.53	424	10.5	79.4	218	91.1
33.3	37.0	4.55	429	10.3	80.0	204	93.0
50.0	42.0	4.59	438	10.3	75.4	201	99.3
64.7	43.2	4.65	428	10.2	82.0	211	96.5
82.3	45.8	4.75	451	10.5	79.6	208	93.2
100.0	47.2	4.78	442	10.4	84.6	194	92.5
116.7	49.1	4.82	433	10.4	87.1	195	93.2
133.3	47.6	4.80	449	10.1	89.8	193	96.0
150.0	49.7	4.86	454	9.7	80.9	210	93.7

TABLE X.—EFFECT OF COUCHING PRESSURE ON BONDING BETWEEN PLIES IN 2-PLY SHEETS OF UNBLEACHED KRAFT—FREENESS 770 CC.

Couching pressure	% Dry, couched	Perpendicular bonding	Tear split
10.0	23.9	97.8	22.6
13.3	23.6	94.7	23.4
23.3	30.0	88.2	22.3
33.3	36.9	98.4	21.7
50.0	40.5	98.8	21.5
64.7	43.3	91.1	21.5
82.3	45.9	89.7	20.1
100.0	47.1	91.1	21.5
116.7	48.8	91.4	21.5
133.3	49.1	103.3	19.0
150.0	45.6	88.7	19.4

TABLE XI.—EFFECT OF COUCHING PRESSURE ON STRENGTH OF 6-PLY SHEETS OF NEWS —10% SULPHITE—FREENESS 425 CC.

Couching pressure	% Dry, couched	Appar. density	Burst	Tear	Riehle	Tensile
10.0	32.8	2.93	132	...	47.4	46.1
13.3	31.3	2.96	128	3.92	49.6	42.9
23.3	34.3	2.89	135	3.94	46.6	43.7
33.3	35.9	2.97	140	4.14	47.7	45.8
50.0	41.8	2.99	149	4.10	49.8	45.8
64.7	42.9	3.04	149	3.87	47.3	45.7
82.3	46.4	3.08	151	4.02	46.5	44.9
100.0	48.7	3.11	159	4.20	48.2	46.7
116.7	48.7	3.16	157	4.30	42.6	44.9
133.3	52.1	3.17	164	4.52	49.3	42.8
150.0	52.4	3.23	164	4.78	48.2	46.2

TABLE XII.—EFFECT OF COUCHING PRESSURE ON BONDING BETWEEN PLIES IN 2-PLY SHEETS OF NEWS —10% SULPHITE—FREENESS 425 CC.

Couching pressure	% Dry, couched	Perpendicular bonding	Tear split
10.0	28.6	30.5	10.1
13.3	25.8	34.3	9.4
23.3	29.4	33.5	9.8
33.3	36.6	34.2	10.2
50.0	37.2	38.2	10.4
64.7	41.5	40.4	13.8
82.3	45.5	38.7	10.6
100.0	46.7	41.2	10.2
116.7	48.6	47.0	13.0
133.3	50.0	45.3	11.3
150.0	50.0	41.0	11.3

plies and the strength of multiply board. The stocks used included unbleached sulphite at different freenesses, unbleached kraft, and news—10 per cent unbleached sulphite. Only the results obtained with the kraft and the news-sulphite are reported. Both 6-ply and 2-ply sheets were used in the study. The bonding tests reported are for the 2-ply and the strength tests are for the 6-ply sheets. The sheets were all pressed with the same final pressure, namely 150 pounds per linear inch. Tables IX to XII show the results obtained.

For all stocks, increasing the couching pressure caused an increase in the bursting strength of the 6-ply sheets, the rate of increase becoming less at the higher pressures, so that the type of curve was very similar to that obtained on beating stock. This might be expected on the basis of Doughty's work *(12, 13)* on the effect of wet-pressing on the tensile strength of the sheet. However, in the case of multiply sheets, the effect of the bonding between plies also has an important effect on the bursting strength. Increasing the couching pressure will either increase or decrease the bonding between plies, depending on the nature of the stock. In either case the change will be small. The bonding between plies of a relatively well-beaten stock decreases little as the couching pressure is increased, whereas that between plies of relatively unbeaten stock shows a tendency to increase.

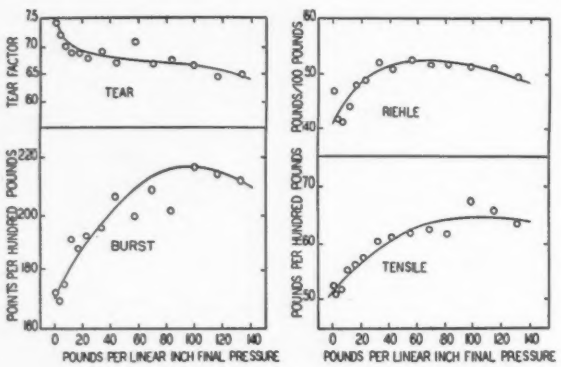

FIG. 4.
Effect of Final Pressure on 2-Ply News-Sulphite

Considering the nature of these stocks, it will be seen that the bonding for those that are hydrated tends to decrease, whereas for those that are not hydrated very much, the tendency is for the bonding to increase with couching pressure. This is understandable on the basis of the mechanisms postulated for determining the area of contact at the interface of the plies. For unhydrated sheets, such as news, the surfaces of the plies at the interface are relatively rough, and an increased amount of pressing during couching results in an increase in the amount of contact between plies. Decreasing the amount of water present at the interface at the time of final pressing will normally reduce the final area of contact, but for a coarse, unfibrillated stock, this effect will not be as great as the effect of pressing the fibers together. On the other hand, for well hydrated or fibrillated stocks, the surfaces at the interface are more regular and, without any final pressing, the area of contact is fairly large. Increasing the total amount of pressing by increasing the couching pressure will increase the area of contact, but not as much as it is reduced by the disturbance caused by water removal and also the presence of less water at the interface during final pressing.

Effect of Final Pressing on Strength Properties and the Bonding between Plies

This study included work on 2- and 6-ply sheets of unbleached sulphite at different freenesses, unbleached kraft, news-10 per cent unbleached sulphite, and in addition, a mixed 2-ply sheet, the top ply of which was unbleached sulphite and the bottom ply news-10 per cent sulphite.

The effect of changing final pressure on the bonding between 2-ply sheets of unbleached sulphite has already been illustrated by Fig. 1. The data obtained using unbleached kraft and the mixed 2-ply sheets are presented in Tables XIII to XVI and in part by Fig. 4.

For all stocks and at all freenesses, increasing the final pressure increased the bonding between plies, the rate of increase being greater at the lower pressures, with the bonding approaching a constant value

TABLE XIII.—EFFECT OF FINAL PRESSING ON STRENGTH OF 6-PLY SHEETS OF UNBLEACHED KRAFT —FREENESS 770 CC.

Final pressure	% Dry, pressed	Appar. density	Burst	Tear	Riehle	Tensile
0.0	35.3	3.75	346	11.3	74.1	88.3
10.0	36.5	3.89	360	10.7	69.8	88.7
13.3	36.8	3.88	355	11.8	76.6	76.8
23.3	37.0	3.90	355	11.3	76.0	77.7
33.3	40.2	4.00	358	12.3	79.5	81.9
50.0	42.8	4.06	377	10.9	78.4	85.1
64.7	45.2	4.28	386	11.4	78.1	87.7
82.3	45.4	4.35	388	10.9	83.2	88.4
100.0	46.6	4.52	390	11.4	80.4	84.4
116.7	48.3	4.48	389	10.7	80.7	89.0
133.3	47.6	4.49	398	11.1	82.4	85.9
150.0	48.3	4.53	394	11.2	82.5	94.1

TABLE XIV.—EFFECT OF FINAL PRESSING ON BONDING BETWEEN PLIES IN 2-PLY SHEETS OF UNBLEACHED KRAFT—FREENESS 770 CC.

Final pressure	% Dry, pressed	Perpendicular bonding	Tear split
0.0	28.0	43.9	17.5
10.0	30.8	56.6	15.3
13.3	29.0	46.6	19.7
23.3	35.6	57.3	16.1
33.3	38.4	70.2	17.0
50.0	41.3	77.5	24.9
64.7	43.6	69.6	20.3
82.3	45.1	86.9	19.3
100.0	47.9	77.0	19.0
116.7	47.1	81.5	20.6
133.3	50.1	80.3	20.4
150.0	51.0	89.8	21.7

at the higher pressures. This constant value is reached at a lower pressure if the stock is fibrillated than if it is a coarse stock. This is reasonable, because the coarser stock depends primarily on the effect of pressure to give sufficient contact between plies so that good bonding may result. For stocks that are relatively well beaten, the optimum amount of pressure required to bond the plies together is quite low (approximately 40 lb. per linear in.).

As the amount of final pressure was increased the bursting strength of the sheet increased. This would be expected because the bursting strength of single sheets tends to increase with increasing wet-pressing *(12, 13)* and the bursting strength of multiply sheets increases with the bonding between plies. The stiffness of the multiply sheets increased with the density of the sheet and the bonding between plies. In this test it is the increasing bonding between plies and fibers that is the important factor, not the increasing sheet density as will be shown in the effect of calendering. The tearing strength was not appreciably changed by changing the final pressure, except when the structure of the sheet was changed so that the sheet would tend to split in the tear test instead of tear in a line-type tear. Such a tear does not give acceptable values.

In general, an increase in the amount of final pressure results in an effect very similar to a small amount of beating. However, there is little change in the strength characteristics of the sheet brought about by the use of a pressing force greater than approximately 50 lb. per linear inch.

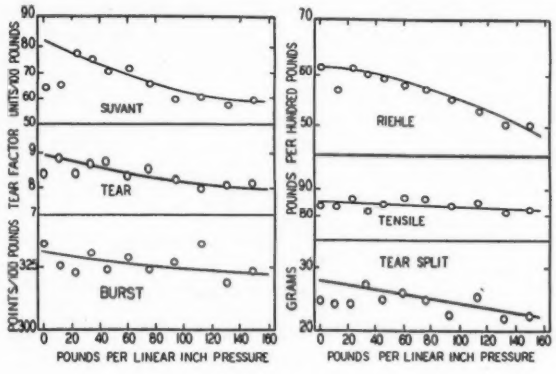

FIG. 5.
Effect of Calendering Pressure on Unbleached Sulphite

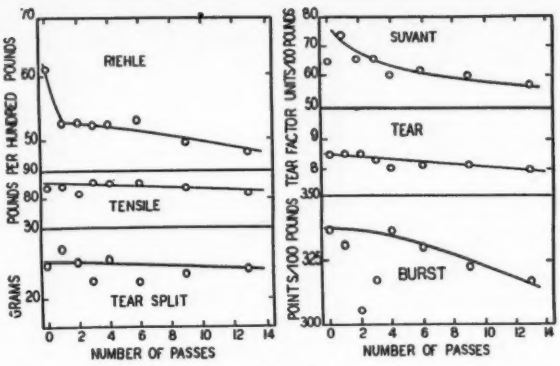

FIG. 6.
Effect of the Number of Calendering Passes

Effect of Calendering on Strength and Bonding

Some preliminary work indicated that calendering of multiply sheets decreased the strength and bonding to an appreciable extent. The results of part of this work are presented in Table XVI.

A more complete study was then undertaken to determine the effect of calendering on sheets of unbleached sulphite. The sheets used were 64-lb., 2-ply sheets made from stock with a freeness of 620 cc. The sheets were couched with a force of 3.3 and pressed with a force of 66.7 lb. per linear inch. Both the calendering pressure, using 4 passes, and the number of passes at a pressure of 112.5 lb. per in. were varied. Figures 5 and 6 indicate the results obtained. The effect of calendering on thin single sheets (basis weight 13.2 lb. per 1000 sq. ft.) made from the same stock and wet-pressed at 66.7 lb. per in. is shown by Table XVII.

Calendering a sheet, whether it be a single sheet or a multiply sheet, reduces the strength of the sheet. If

TABLE XV.—EFFECT OF FINAL PRESSING ON A 2-PLY SHEET, TOP PLY UNBLEACHED SULPHITE — FREENESS 595 CC., BOTTOM PLY NEWS—10% SULPHITE—FREENESS 255 CC.

Final pressure	% Dry, pressed	Appar. density	Burst	Tear	Riehle	Tensile	Stretch	Perpendicular bonding	Tear split
0.0	20.6	2.48	172	7.4	46.9	52.4	3.90	27.7	11.9
3.3	22.8	2.55	169	7.2	41.5	50.7	3.88	12.9	7.0
6.7	25.3	2.72	179	7.0	41.1	51.5	3.66	14.5	8.6
11.7	25.4	2.75	192	6.9	43.9	55.2	3.86	31.2	11.8
16.7	30.1	2.96	188	6.9	47.8	56.0	3.72	37.0	13.9
22.3	32.2	3.04	193	6.8	48.8	57.4	4.00	37.8	12.8
33.3	35.6	3.10	196	6.9	52.1	60.6	3.98	40.5	13.1
43.3	36.3	3.18	207	6.7	50.9	61.4	3.62	41.7	14.3
56.7	39.6	3.29	200	7.1	52.5	62.2	3.81	42.0	14.1
70.0	42.2	3.37	209	6.7	51.7	62.6	4.28	43.4	15.3
83.3	43.9	3.42	202	6.8	51.8	62.0	3.86	42.4	15.6
100.0	44.1	3.50	216	6.7	51.4	67.5	3.88	42.5	15.6
116.7	45.4	3.54	214	6.5	51.4	65.7	3.96	42.2	15.4
133.3	46.4	3.49	212	6.5	49.7	63.7	3.94	41.8	15.1

TABLE XVI.—EFFECT OF CALENDERING ON PROPERTIES OF 2-PLY NEWS—10% SULPHITE—UNBLEACHED SULPHITE SHEETS

Final pressure	Appar. density	Burst	Tear	Riehle	Tensile	Stretch	Perpendicular bonding	Tear split
				Uncalendered				
0.0	2.48	172	7.4	46.9	52.4	3.90	27.7	11.9
33.3	3.10	196	6.9	52.1	60.6	3.98	40.5	13.1
133.3	3.49	212	6.5	49.7	63.7	3.94	41.8	15.1
				Calendered				
0.0	3.12	157	5.5	31.5	48.6	3.60	5.5	4.9
33.3	3.56	191	5.6	41.9	56.0	3.84	32.7	15.0
133.3	3.90	208	5.5	43.0	61.5	3.80	36.0	15.2

TABLE XVII.—EFFECT OF CALENDERING ON SINGLE SHEET OF UNBLEACHED SULPHITE

	Uncalendered	Calendered
Apparent density	2.52	3.56
Burst	236	206
Tear	4.61	3.79
Suvant	9.7	8.0
Riehle	25.4	22.4
Tensile	84.1	83.6
Stretch	3.04	2.82
Perpendicular bonding	75.6	60.5

it is well bonded before calendering, the reduction in all strength tests except stiffness is small, but if the sheet is only loosely bonded originally, calendering at 150 lb. per in. causes a large decrease in both strength and bonding.

Although the bursting strength of a well-bonded sheet is reduced only slightly, the stiffness, as measured by both the Riehle and Suvant testers, is reduced appreciably by the calendering action. The fact that the sheet loses stiffness indicates that it is not the "solid fraction" that governs the strength tests of the sheet but the bonding that exists in the sheet. The tearing strength decreased with calendering pressure, because the denser sheet tore more nearly in a line.

From the small amount of data presented it may be readily seen that the less calendering that is required to obtain a given finish on board, the better the sheet will be, and that any treatment that will cause the sheet to have a better surface as it reaches the calenders will produce a sheet with greater stiffness, strength, and better yardage. For any given caliper and finish, reducing the amount of calendering that it is necessary to give a board improves all the major properties of the sheet.

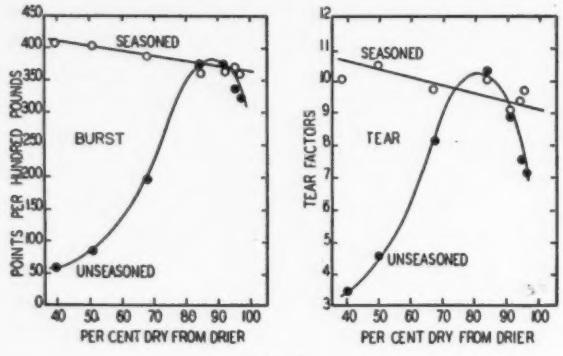

FIG. 7.
Effect of Drying

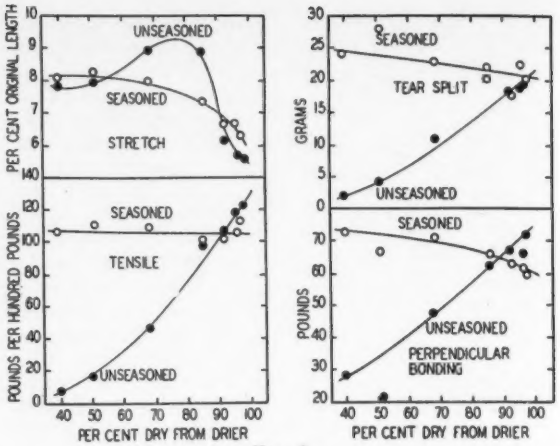

FIG. 8.
Effect of Drying

Effect of Drying on Strength and Bonding

This work was carried out to determine the effect of the moisture content of the final sheet on the bonding and strength tests, both at the moisture content at which the sheet left the drier and after it had been allowed to come to equilibrium with air at 70 deg. F. and a relative humidity of 65 per cent. It was carried out on a series of sheets made from unbleached sulphite with a freeness of 585 cc., couched at 3.3 and pressed at 66.7 lb. per in. The sheets to be tested at the moisture content at which they left the drier were placed in sealed containers and taken out just before testing. The results obtained are presented in Fig. 7, 8, and 9.

Apparently both the amount of drying and the moisture content of the sheets at the time of testing have an effect in determining the strength properties and the strength of the bonding between plies in a multiply sheet. However, the tests are affected more by the moisture content of the test sample than by the amount of drying.

As the amount of moisture in the sheet is reduced, the bonding between plies, as measured by both the perpendicular and the tear split tests, increases regu-

TABLE XVIII.—EFFECT OF BEATING ON UNBLEACHED SULPHITE—THIN SINGLE SHEETS

Minutes	Freeness	Appar. density	Burst	Tear	Fold	Tensile	Stretch	Perpendicular bonding
0	830	2.58	101	5.70	7	44.2	2.20	25.9
25	690	2.88	254	6.05	131	85.9	3.22	50.6
50	550	3.07	262	4.85	604	93.1	3.10	67.9
75	415	3.04	286	4.46	990	106.1	3.16	75.1
120	245	2.66	244	3.74	1631	107.8	3.92	76.6

TABLE XIX.—EFFECT OF BEATING ON UNBLEACHED SULPHITE—THICK SINGLE SHEETS

Minutes	Freeness	Appar. density	Burst	Tear	Riehle	Tensile	Stretch	Perpendicular bonding
0	830	3.13	110	7.70	32.8	42.2	3.26	10.6
25	690	3.91	232	9.71	48.4	79.0	3.88	45.7
50	550	3.92	246	9.63	60.9	62.5	4.46	73.0
75	415	4.06	263	9.36	67.6	81.0	4.04	78.7
120	245	4.34	240	7.96	67.9	95.1	3.34	63.4

TABLE XX.—EFFECT OF BEATING ON UNBLEACHED SULPHITE 2-PLY SHEETS, BOTH PLIES THE SAME

Minutes	Freeness	Appar. density	Burst	Tear	Riehle	Suvant	Tensile	Stretch	Perpendicular bonding	Tear split
0	830	3.56	131	8.0	31.0	38.8	43.6	3.56	13.0	9.9
11	775	4.04	248	8.6	45.1	46.5	65.9	5.22	30.7	15.6
25	690	4.08	299	8.7	52.5	44.3	84.2	5.68	42.6	22.1
50	550	4.18	334	9.1	54.8	43.7	83.5	5.94	61.6	28.3
75	415	4.03	290	9.0	57.1	43.5	77.7	7.34	73.9	48.8
82	380	4.22	290	9.0	61.1	40.6	65.4	7.18	66.9*	53.7
120	245	4.13	246	8.3	63.6	36.4	61.7	7.10	69.5*	...*

* Ply weaker than bond

larly by an almost linear relationship. On the other hand, when the sheets are allowed to come to the same equilibrium moisture content, the bonding between plies is found to be slightly lower for the sheets that have been dried the most. Drying the sheets too much causes a reduction in the elasticity of the cementing structure between the fibers and plies. If the moisture content of the sheets is maintained very low, the result of the hardening action is to increase the strength of the bonding between plies. This is also observed in the strength of the bond between fibers, for the tensile strength of the sheet continues to increase as the sheet becomes drier. On the other hand, the burst shows a point of maximum strength, but this maximum is caused by the decrease in stretch of the fibers and not the bonding between plies or fibers. All the results obtained in this phase of the investigation can be related to the increased brittleness and stiffness that is obtained when the sheet is dried to low moisture contents.

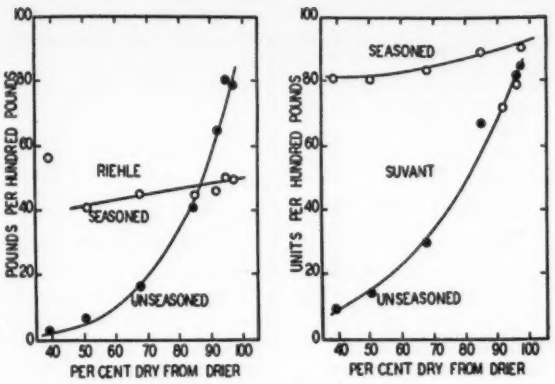

FIG. 9.
Effect of Drying

Effect of Beating on Strength and Bonding

The effect of beating on both bleached and unbleached sulphite and the effect of milling in a pebble mill on the unbleached sulphite was determined. Of these experiments, only the results obtained by beating unbleached sulphite are presented. Several different kinds of sheets were used for this portion of the work. They were thin single sheets with a weight of about 13 lb. per 1000 sq. ft.; thick single sheets with a weight of about 53 lb.; 2-ply sheets, both plies the same; 2-ply sheets, the top ply constant with a freeness of 775 cc.; 2-ply sheets, the bottom ply constant with a freeness of 380 cc. All 2-ply sheets had a weight of about 68 pounds. The single sheets were pressed with a force of 66.7 lb. per in.; the 2-ply sheets were couched with a force of 3.3 and pressed with a force of 67.7 lb. per in. The results obtained are presented in Tables XVIII to XXII.

On the basis of the idea that any treatment that increases the actual area of contact between plies will increase the strength of the bond between them or that for the same amount of bonded area the force is always the same, it may be said that beating makes possible a greater area of contact between plies and, therefore, causes a higher bonding force to exist between them but does not change the force which holds a given area of contact together. The manner in which beating increases this bonding is very similar to that by which the bonding between fibers inside the plies increases with beating. However, when the beating has been carried past a certain point, any attempt to split the two plies results in the sheet splitting inside one of the plies rather than at the interface between plies. The freeness at which this type of splitting takes place is dependent on the kind of stock and the nature of the beating action; it is at a freeness of about 400 cc. for unbleached sulphite beaten in a laboratory beater.

To explain the splitting inside of the ply, it is necessary to return to the idea of the three fundamental strengths which exist in a multiply sheet. The bonding between plies and fibers is equal when both plies are made from the same stock. Therefore, for the plies to split rather than the bond between them, the third strength, namely, that of the fibers themselves, must be the weakest strength in the sheet and the one measured by the perpendicular bonding test. The bonding between plies increases with beating until it is greater than the strength of the fiber itself. Beyond this point, the bonding between plies and fibers continues to increase, but the overall strength of the sheet becomes less, due to the decreasing fiber strength. If the fibers are allowed to retain more of their original strength (by rod milling rather than beating the stock), the bonding between plies can be increased to a greater value before it exceeds the strength of the fibers.

A consideration of the relation between the bursting strength and the bonding between plies shows a close correlation. The bursting strength is dependent on the tensile strength of the sheet, and this in turn is dependent on the weakest strength in the sheet. At the beginning of the beating, the bondings between fibers and plies are the weakest strengths in the test strip, but as the amount of beating is increased the bonding becomes greater and the strength of the fiber less, until a point is reached beyond which the fiber strength is the weakest strength in the test strip. Therefore, the bursting strength is governed by the strength of the bond between plies and fiber up to the point where it reaches a maximum. Beyond the maximum, the bursting strength is dependent on

TABLE XXI.—EFFECT OF BEATING ON UNBLEACHED SULPHITE 2-PLY SHEETS, TOP PLY FREENESS 775 CC.

Minutes	Freeness	Appar. density	Burst	Tear	Riehle	Suvant	Tensile	Stretch	Perpendicular bonding	Tear split
0	830	3.88	210	8.4	39.5	49.0	55.1	4.20	22.1*	14.6
11	775	4.04	248	8.6	45.1	46.5	65.9	5.22	30.7	15.6
25	690	3.98	258	8.8	52.0	45.5	71.7	6.50	30.7	18.6
50	550	4.09	270	9.2	51.3	49.0	72.7	5.92	28.5*	19.1
75	415	4.12	259	9.0	49.7	43.5	74.0	5.94	31.4*	29.6
120	245	4.20	250	8.3	52.3	40.4	60.0	6.04	30.3*	30.9

TABLE XXII.—EFFECT OF BEATING ON UNBLEACHED SULPHITE 2-PLY SHEETS, BOTTOM PLY FREENESS 380 CC.

Minutes	Freeness	Appar. density	Burst	Tear	Riehle	Suvant	Tensile	Stretch	Perpendicular bonding	Tear split
0	830	3.84	212	7.8	48.0	31.4	61.4	5.64	14.1	18.1
25	690	4.17	310	8.4	60.3	36.4	78.4	6.86	44.6	44.7
50	550	4.22	326	8.7	62.8	34.8	75.7	7.90	65.1*	57.1
75	415	4.27	298	8.9	59.4	39.7	72.8	6.68	73.2*	...*
82	380	4.22	290	9.0	61.1	40.6	65.4	7.18	66.9*	...*
120	245	4.14	250	8.9	61.1	30.6	59.7	6.26	72.1*	...*

* Freer sheet weaker than bond

the strength of the fibers. Thick heavy sheets are more applicable to considerations like this, because if 2-ply sheets are used, the splitting inside the plies complicates the study, and if thin single sheets are used, the thinness of the sheet and the small change in the sheet density do not allow the bonding between fibers to become sufficiently great as beating progresses.

The data obtained for the effect of beating on properties other than the bonding between plies require little explanation. It will be noted that a heavy sheet does not show a typical tear curve on beating, due to a partial splitting of the sheet rather than a clean tearing; however, it must be remembered that, for use requirements, it is the magnitude of the force rather than the nature of the tear that is important. The stiffness of the sheet increases with beating, whereas the tensile strength nearly parallels the bursting strength.

When the results obtained on the mixed 2-ply sheets are studied, it will be observed that the presence of one ply of constant composition alters the magnitude and rate of change in the strength and bonding results as the amount of beating of the other ply is increased. The use of a ply made from free stock slows up the rate of increase of the bursting strength of the overall sheet and reduces the value which the burst reaches at maximum. The use of a slow stock for the constant ply acts in an opposite manner.

Increasing the ability of one ply to bond will cause an increase in the bonding between that ply and a ply with constant bonding characteristics. The increase will continue until the bond between plies is greater than the force holding the fibers together in the freer ply, so that this ply splits rather than the bond.

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(16) Griffin, Roger Castle. "Technical methods of analysis." 2d edition, especially p. 456-457. New York, McGraw-Hill, 1927, 936 p.
(17) Halladay, J. F., and Ulm, R. W. K., *Paper Trade J.* 108, no. 5:36-40 (Feb. 2, 1939).
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(20) Kirkpatrick, William A., II, *Paper Trade J.* 109, no. 12:36-38 (Sept. 21, 1939).
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Engineering Papers at TAPPI Meeting

Nearly every one of the twenty sessions of the Annual Meeting of the Technical Association of the Pulp and Paper Industry to be held at the Roosevelt Hotel, New York, N. Y. on February 17-20, 1941 will have one or more papers of a distinctly engineering character.

Two sessions, however, will be devoted to subjects of primary interest to mill engineers and operating superintendents.

Roderick O'Donoghue, Chairman of the TAPPI Heat and Power Committee has announced the following interesting group of papers:

"Relation of the Power Plant to the Pulp and Paper Mill" by D. G. Moon, J. E. Sirrine & Company.

"Short Cuts in Combustion" by Philip W. Swain, "Power" (McGraw-Hill).

"Recovery of Paper Machine Heat" by R. T. Wetmore, Anglo-Newfoundland Development Company. (By title)

"Blowdown Heat Recovery Systems for Sulphate Mills" by G. A. K. Hunt and H. C. L. Miller, Foster-Wheeler Corporation.

"Continuous Conditioning of Paper" by A. E. Montgomery, J. O. Ross Engineering Company.

"Lubrication of Paper Machinery" by T. E. Dial, Socony-Vacuum Corporation.

In addition to these papers James A. Lee, Chairman of the TAPPI Materials of Construction Committee announces the following papers for his session:

"Characteristics and Services of Monel Jordan Fillings" by T. E. Lagerstrom and F. P. Huston, International Nickel Company.

"Progress Made With the Use of Rubberized Equipment Primarily for Corrosion and Erosion Resistances" by John F. Amlicke, Manhattan Rubber Company.

"Meeting Present Day Requirements for Anti-Friction Bearings on Paper Machines" by B. R. Sackett and C. N. Benson, SKF Industries, Inc.

"Factors in Fourdrinier Wire Corrosion" by H. G. Specht, Eastwood-Neally Corp. Round Table Discussion of Mill Piping led by S. B. Jones, West Virginia Pulp and Paper Company.

Round Table Discussion of Packing Materials led by J. W. Hempill, Johns-Manville Corporation.

Pulp and paper manufacturers are urged to arrange to have their principal power and maintenance engineers present to benefit by the discussions and presentations during the various sessions of the TAPPI annual convention. Nearly one thousand individuals attended the meeting of 1940.

Study Motor Truck Logging

VANCOUVER, B. C., January 11, 1941—Motor truck logging operations on the west coast of Vancouver Island are now being closely studied by J. A. McNally, woods superintendent of the Anglo-Canadian Pulp and Paper Company, Quebec, and by A. N. Robertson of the technical staff of the same company.

The Quebec officials have been assisted in part of their study by Claude S. Thicke, managing director of the Hayes Manufacturing Company, Vancouver, B. C., who have supplied motor trucks and logging trailers for many of the major truck operations in British Columbia.

FASHIONS SEVEN LEAGUE BOOTS FOR PRODUCTION!

As never before, *time* is the essence of preparedness — time translated into speed for sound planning, rapid construction and effective production.

Here is capacity to execute thorough and comprehensive plans at top speed and get construction scheduled concurrently without loss of time—seasoned during the last war by experience in the conversion of industry to defense needs and by participation in construction of cantonments and other military structures.

For those who need speed in plans, design, construction or engineering studies, we have available the services of a departmentalized and balanced engineering organization with a continuous experience of forty years.

Engineers

J. E. SIRRINE & COMPANY

Greenville South Carolina

INDUSTRIAL PLANTS • PAPER MILLS • TEXTILE MILLS • PLANS AND DESIGNS
STEAM UTILIZATION • TOBACCO FACTORIES • KNITTING MILLS • LOCATION STUDIES
APPRAISALS • REPORTS • WATER TREATMENT • WATER SUPPLY • SURVEYS • POWER

Date PACKING RECORD
Jan 4 repacked stuffing box pump No. 3
Jan 8 adjusted stuffing box pump No. 1
Jan 15 shut down pump No. 3-Hot stuffing box
Jan 27 repacked stuffing box pump No. 2
Jan 30 replaced scored shaft sleeve pump No. 1

If your pump maintenance record has items like these... Switch to

•PALMETTO
for steam and hot fluids

•PALCO for water **•PELRO** for solvents, oils

•CUTNO for alkalis **•SUPER CUTNO** for acids

What is the evidence that Greene, Tweed Packings put an end to such annoyances and expenses? Here it is, and it's mighty convincing proof: *More than 90% of the engineers who have tried out working samples of these packings have become permanent users.*

These engineers have demonstrated to their own satisfaction that our packings actually do last longer and give better service. Start the New Year right by making the test for yourself.

• Reg. U. S. Pat. Off.

FREE WORKING SAMPLE

Here's our offer. **Test any Greene, Tweed packing or the new Palmetto SuperSheat under your own operating conditions. No charge, no obligation. Just fill in and mail the coupon, and your free sample will be sent by return mail.**

GREENE, TWEED & CO., 101 Park Ave., New York
Send free working sample of packing ..... size, for ..... service.
☐ **Send free working sample of Palmetto SuperSheat.**

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Company .....
Address .....

Imports of Paper and Paper Making Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard; Bleached Sulphite More Acute—Some Grades of Old Waste Lower.

NEW YORK IMPORTS

WEEK ENDING JANUARY 11, 1941

SUMMARY

Paper hangings .....8 bls.
Newsprint .....14,038 rolls
Printing paper .....4 cs.
Wrapping paper.....252 rolls, 1,050 pkgs., 462 bls.
Tracing cloth.....13 cs.
Drawing paper.....4 cs.
Filter paper.....108 cs.
Art gold paper.....1 cs.
Photo paper.....225 cs.
Decalcomania paper.....47 cs.
Stencil paper.....2 cs.
Tissue paper.....2 cs.
Paper cloth.....10 cs.
Transparent paper.....10 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., ——, Liverpool, 8 bls.

NEWSPRINT

——, ——, Comeau Bay, 7,523 rolls.
H. Reeve Angel & Co., Inc., ——, Petsamo, 399 rolls.
——, ——, Liverpool, N.S., 6,116 rolls.

PRINTING PAPER

——, ——, Liverpool, 4 cs.

WRAPPING PAPER

L. Glickman & Co., ——, Petsamo, 224 rolls.
Brooklyn Standard Bag Corp., ——, Petsamo, 1,050 pkgs., 130 bls.
Jay Madden Corp., ——, Petsamo, 273 bls.
Walker-Goulard-Plehn Co., Inc., ——, Petsamo, 59 bls.
Jay Madden Corp., ——, Petsamo, 28 rolls.

TRACING CLOTH

Dingelstedt & Co., ——, Liverpool, 13 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., ——, Liverpool, 4 cs.

FILTER PAPER

E. H. Sargent & Co., ——, Petsamo, 35 cs.
H. Reeve Angel & Co., Inc., ——, Liverpool, 21 cs.
E. H. Sargent & So., ——, Petsamo, 14 cs.
H. Reeve Angel & Co., Inc., ——, Liverpool, 38 cs.

ART GOLD PAPER

I. S. Silva, ——, Lisbon, 1 cs.

PHOTO PAPER

——, ——, Liverpool, 26 cs.
——, ——, Liverpool, 199 cs., (base paper).

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., ——, Liverpool, 47 cs. (duplex).

STENCIL PAPER

Frankel Carbon & Ribbon Co., ——, Liverpool, 2 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., ——, Liverpool, 1 cs.
——, ——, Liverpool, 1 cs.

PAPER CLOTH

——, ——, Osaka, 10 cs.

TRANSPARENT PAPER

——, ——, Kobe, 10 cs.

RAGS, BAGGINGS, ETC.

Padawer Co., ——, Bombay, 150 bls. cotton waste.
C. Comiter, ——, Bombay, 500 bls. cotton waste.
Green Textile Associates, ——, Shanghai, 50 bls. cotton waste, 150 bls. picker waste.
C. Comiter, ——, Shanghai, 100 bls. cotton waste.
Bank of New York, ——, Santos, 20 bls. rags.
Richard Shipping Co., ——, Santos, 15 bls. rags.
——, ——, Buenos Aires, 36 bls. cotton waste.
——, ——, Liverpool, 91 bls. rags.
——, ——, Liverpool, 247 bls. paperstock, 146 bls. rags.
M. Sigal & Son, ——, Buenos Aires, 41 bls. rags.
Castle & Overton, Inc., ——, Buenos Aires, 7 bls. rags.
Irving Trust Co., ——, Vera Cruz, 89 bls. waste bagging.
J. Levy & Son, ——, Havana, 44 bls. rags.
Chemical Bank Trust Co., ——, Shanghai, 250 bls. cotton fly waste, 50 bls. picker waste.
Pan American Trust Co., ——, Shanghai, 85 bls. cotton waste.
Manufacturers Trust Co., ——, Shanghai, 100 bls. cotton waste.
Padawer Co., ——, Shanghai, 100 bls. cotton waste.
Irving Trust Co., ——, Shanghai, 100 bls. cotton waste.
Philadelphia National Bank, ——, Callao, 14 bls. rags.

OLD ROPE

——, ——, Liverpool, 390 coils.

GLUESTOCK

Manufacturers Trust Co., ——, Buenos Aires, 144 bls.
Darmstadt Scott & Courtney, ——, Buenos Aires, 152 bls.
Manufacturers Trust Co., ——, Buenos Aires, 5 bls.

HIDE CUTTINGS

Karch Import Co., ——, Manila, 109 bls.
——, ——, Liverpool, 104 bags.

CASEIN

Chase National Bank, ——, Buenos Aires, 1,667 bags.
American British Chemical Supplies, ——, Buenos Aires, 500 bags.
American Cyanamid & Chemical Corp., ——, Buenos Aires, 834 bags.
A. Hurst & Co., ——, Buenos Aires, 167 bags.
——, ——, Buenos Aires, 2,267 bags.

PORTLAND IMPORTS

WEEK ENDING JANUARY 11, 1941

Pulp Sales Corp., ——, Petsamo, 9,705 bls. prime strong sulphate.

BOSTON IMPORTS

WEEK ENDING JANUARY 11, 1941

——, ——, Shanghai, 600 bls. cotton waste.

PHILADELPHIA IMPORTS

WEEK ENDING JANUARY 11, 1941

National City Bank, ——, Buenos Aires, 106 bls. gluestock.
A. Hurst & Co., ——, Buenos Aires, 84 bags casein, 5,040 kilos.

BALTIMORE IMPORTS

WEEK ENDING JANUARY 11, 1941

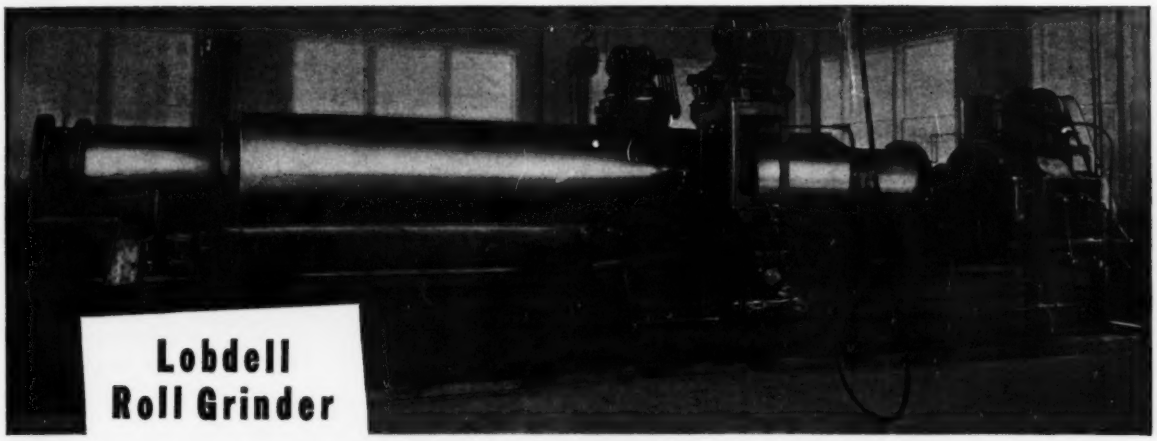
Jay Madden Corp., ——, Petsamo, 373 rolls newsprint.
Pulp Sales Corp., ——, Petsamo, 1,725 bls. prime strong sulphate, 300 tons; 6,775 bls. prime strong sulphite, 1,256 tons; 301 bls. prime bleached sulphate, 60 tons.

LOS ANGELES IMPORTS

WEEK ENDING JANUARY 11, 1941

——, ——, Powell River, 1,005 pkgs. newsprint.
——, ——, Kobe, 3 cs. rice paper.

7 IS A LUCKY NUMBER *If These Seven Distinctive Advantages Are At Work For You!*



SEVEN superior features in LOBDELL ROLL Grinders: 1—The new V-Belt Wheel Drive that increases power, improves rigidity. 2—The open design that permits placement of rolls directly on the machine from overhead crane or hoist. 3—The fully enclosed screw-well, automatically lubricated, sealed against water or grit. 4—Automatically lubricated bed ways. 5—Provision for keeping the bed constantly in perfect alignment. 6—Rigid support under grinding wheels for all roll diameters. 7—Single micrometer adjustment for any predetermined crown.

These are Lobdell's seven answers to your common roll grinding problems. More complete explanation, yours on request, shows the multiple savings made possible. Write—

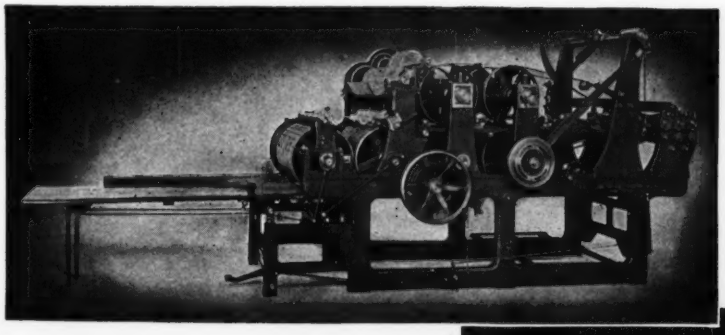
LOBDELL

CAR WHEEL COMPANY

105 Years in Business

WILMINGTON·DELAWARE

PAPER BAG MACHINERY . . .



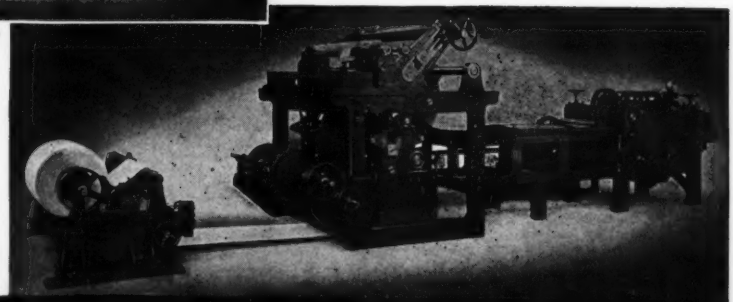
Machinery for flat, square, and satchel bottom bags. The famous tuber and bottomer for flour, cement, lime, and other heavy materials.

Heavy duty combination bottomer for valve or satchel bottoms.

←

Tuber for multiwall pasted bottom tubes with **Electric Eye** web control, keeping edge of paper in line for side seams and cross paster for bottoms.

→



The SMITH & WINCHESTER *Manufacturing Company*

SOUTH WINDHAM CONNECTICUT 2

New York Paper and Pulp Market Review

Paper Market Firm With Improved Demand For Some Grades Reported This Week—Pulp Market Firmer With Unbleached Sulphite and Northern Kraft Scarce — Other Markets Unchanged.

Office of the PAPER TRADE JOURNAL,
Wednesday, January 15, 1941.

With the rising tide of general business activity stimulating demand for many kinds of consumer goods, the trend for many grades of paper has turned more definitely upward. More inquiries and orders are reported this week from many manufacturers' representatives, jobbers, and general paper merchants. Demand for papers by printers for direct-mail, advertising and general letterpress printing, are reported improved in some quarters of the trade.

The index of general business activity rose to 123.0 per cent for the week ended January 4, from 121.1 per cent for the preceding week, compared with 113.3 per cent for the corresponding week for 1939.

The Federal Reserve Board's index of industrial production for December was 136, compared with 133 for November and with 129 for October, 1940. For the entire year of 1940, the index averaged 122, compared with 108 in 1939, 113 in 1937 and 110 in 1929. The increase in 1940 over 1929 was largely in non-durable goods and minerals, although the output of durable goods was also substantially higher in 1940 than in 1929.

Wholesale commodity prices, including all commodities, are slowly rising. The index of the Bureau of Labor Statistics for the week ended January 4, advanced to 80.2 per cent for the first time since February, 1938. The advance has been moderate.

Paper production of 220 mills for the week ended January 4 was estimated at 86.4 per cent, compared with 66.1 per cent for 1939, with 58.4 per cent for 1938, with 92.1 per cent for 1937, and with 72.5 per cent for the corresponding week for 1936.

Paper board production for the week ended January 4 was 59.0 per cent, compared with 45.0 per cent for 1939, with 45.0 per cent for 1938, with 77.0 per cent for 1937, and with 51.0 per cent for the corresponding week for 1936.

The newsprint market is firm with prices stabilized at $50 per ton for the first quarter of the current year. U. S. production for December, 1940, was 80,837 tons; shipments, 84,037 tons. Canadian production was 252,897 tons; shipments, 276,457 tons. Newfoundland produced 27,991 tons.

Total U. S. production of newsprint for 1940 was 1,013,437 tons, an increase of 7.9 per cent over 1939. Canada produced 3,418,803 tons, an increase of 19.2 per cent over 1939. Newfoundland produced 352,585 tons, an increase of 14.5 per cent over 1939.

Mechanical Pulp

The mechanical pulp market is firm. U. S. production of groundwood, which has continued to steadily increase during the fall months, is continuing at a high level. Prices are unchanged.

Chemical Pulp

A stronger tone is reported in the chemical pulp market this week. Good grades of unbleached sulphite and northern kraft pulps are reported scarce in some quarters of the trade. The price trend of the market is upward but no important change from prevailing representative market prices has been reported during the current week.

Rags

Trading in the rag market is moderate in several grades this week. No important change in the prices on any grade of rags has been reported at this date.

Old Rope and Bagging

The old rope market is steady, with old Manila prices very firm and unchanged.

Quotations on old bagging are unchanged at prevailing market prices. Trading is reported as limited at this date.

Old Waste Paper

Quotations on all grades of old waste paper are reported firm. Several export orders on lots of 500 to 1000 tons of mixed paper are reported. No important change from prevailing market quotations has been reported this week.

Twine

The twine market is reported firm. Inquiries are reported increasing in some quarters of the trade and reports indicate a substantial increase in demand is expected early this spring. Prices continue unchanged at prevailing market quotations.

Saxe Paper Co. Building Burns

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., January 13, 1941—The Saxe Paper Company's plant, consisting of five stories located at southeast corner of Race and Orianna streets, of which Nate Saxe, immediate past president of the Paper Trade Association of Philadelphia is president, was destroyed by fire last Friday evening, January 10. Two alarms were sounded as the flames licked out across Orianna street, but by midnight the flames were controlled and traffic on Race and 4th streets, which had been halted by the congestion of fire apparatus, resumed its flow. The rapid control of the flames was attributed in part to the fact that directly across Race street from the burning building is located Truck Company No. 2.

Walter R. Hicks, Jr. Married

Walter R. Hicks, Jr., president of Daniel M. Hicks, Inc., paper mill supplies, 565 Fifth avenue, New York, and Miss Jackie Burke of Chicago, were married in Chicago on January 11. After a wedding trip they will reside in New York.

sonoco

For all uses that require an extremely tough, strong, durable product, SONOCO has developed the new RHINO non-returnable paper mill core. Exhaustive tests for breaking and crushing strength and all around toughness indicate its superior qualities.

RHINO
NON-RETURNABLE

Returnable Cores
Equipped With
BERMICO* Metal Ends

DURO is a standard core of plus-standard quality. Made from our own especially manufactured paper stock. DURO cores are made standard 3⅛" I. D. These cores are equipped with BERMICO open or closed notch, metal ends to fit 3" shaft. TAYLOR Ends that protect inside of core only, can also be specified.

EN-DURO a super-quality core to meet extra demands for strength and service where needed. This is our highest grade core. All cores will take either BERMICO or TAYLOR Ends which can be furnished lacquered in various colors for easy identification... Both DURO and EN-DURO cores have a thick kraft surface cover.
*(Reg. Trade Mark)

PAPER MILL CORES

LOW COST —BETTER QUALITY

Exclusive distributors
BERMICO (Reg. Trade Mark) ENDS *and* BERMICO (Reg. Trade Mark) FIBRE CORES

Strong cellulose fibres are formed into a homogeneous tube and then especially treated to resist all weather and moisture changes. The Bermico Core is light in weight and extremely hard, strong, rugged. These particular cores have exceptionally long life in either returnable or mill roll service.

SONOCO MAKES *EVERYTHING* IN *PAPER CARRIERS*

SONOCO PRODUCTS COMPANY

BRANTFORD ONT. HARTSVILLE S. C. MYSTIC CONN.

SHIPPING POINTS: LOWELL, MASS. HARTSVILLE, S. C.

DEPENDABLE SOURCE OF SUPPLY

"NON-USERS ARE THE LOSERS"

50TH ANNIVERSARY

TENAX FELTS

BOTH HAVE BENEFITED

This year we celebrate a half century of service to the papermakers of America. All agree that we may justly be proud of the records made by TENAX FELTS.

We have cooperated constantly with the technical men and superintendents in many mills. Today our list of friends and pleased patrons continues to grow most agreeably. Thank you all sincerely!

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

NEWFANE, N. Y. — U. S. A.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, January 15, 1941.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. Demand reported fair for the week. The pulp is currently quoted at $35 per ton, in barrels, at works; the powder is offered at $50 per ton, f.o.b., works.

BLEACHING POWDER—Prices on bleaching powder are firm with demand reported good for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums at works.

CASEIN—Quotations on casein are reported firm. Demand moderate for the week. Standard domestic casein, 20-30 mesh, is currently quoted at 13 cents per pound; 80-100 mesh, at 13½ cents per pound; all prices in bags, car lots. Standard Argentina casein is currently offered at 12½ cents per pound. No quotations on French casein.

CAUSTIC SODA—Prices on caustic soda are firm and unchanged. Shipments continue in steady volume. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—The demand for chlorine is reported good. Prices are firm and the market strong for the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported as firm with prices higher for the week, "G" gum rosin is currently quoted at $1.85 per 100 pounds, in barrels, Savannah, "FF" wood rosin is currently quoted at $1.85 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $2.54 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm under a good demand with current quotations continuing nominal. Domestic salt cake is currently quoted at $17 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $16.50 per ton on imported salt cake continues nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand reported moderate. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and continue unchanged for the current week. Pearl is currently quoted at $2.95 per 100 pounds; powdered starch at $3.05 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OR ALUMINA—Quotations on sulphate of alumina are firm. Shipments reported steady for the week. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at $1.60 per 100 pounds, in bags, care lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@	$5.75
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.37½	"	4.62½
Standard Wrapping	4.25	"	—
Tissues—Per Ream—Carlots			
White No. 1	.97½	"	—
White No. 1 M. G.	.95	"	—
White No. 1½	.80	"	—
White No. 2	.75	"	—
Anti-Tarnish M. G.	.80	"	—
Colored	.85	"	—
Kraft	.87½	"	—
Manila	.77½	"	—
Unbl. Toilet, 1 M.	3.75	"	—
Bleached Toilet	5.26	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.10	"	—
Bleached, Jr.	3.60	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	8.25	@	10.25
No. 1 Manila Wrapping, 35 lb.	5.25	"	—
No. 2 Manila Wrapping, 35 lb.	5.00	"	—
Boards, per ton—			
News	35.00	@	40.00
Chip	35.00	"	40.00
Sgl. Mla. Ll. Chip	52.50	"	55.00
White Pat. Coated	65.00	"	67.50
Kraft Liners	55.00	"	—
Binders Boards	73.00	"	80.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds			Ledgers		
100% Rag Ext. No. 1	$39.10	@	$46.00	$40.25	@	$47.25
100% Rag	31.05	"	36.50	32.20	"	37.75
85% Rag	....	"	....	29.90	"	35.00
75% Rag	23.60	"	27.75	24.75	"	29.00
65% Rag	....	"	....	21.65	"	26.25
50% Rag	17.55	"	21.50	18.70	"	22.75
25% Rag	14.65	"	17.75	15.80	"	19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds			Ledgers		
No. 1	$9.35	@	$11.50	$11.55	@	$12.75
No. 2	8.50	"	10.25	9.65	"	11.75
No. 3	8.05	"	9.25	9.20	"	11.25
No. 4	7.70	"	9.50	8.90	"	10.75

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.

Delivered in Zone 1:

No. 1 Glossy Coated	$11.90	@	$13.50
No. 2 Glossy Coated	10.35	"	11.75
No. 3 Glossy Coated	9.55	"	11.00
No. 4 Glossy Coated	9.15	"	10.50
No. 1 Antique (watermarked)	9.05	"	10.50
No. 2 Offset	8.40	"	9.75
A Grade E. F.	8.20	"	9.50
A Grade S. & S. C.	8.45	"	9.75
B Grade E. F.	7.65	"	8.75
B Grade S. & S. C.	7.90	"	9.00
C Grade E. F.	7.35	"	8.50
C Grade S. & S. C.	7.60	"	8.75
D Grade E. F.	7.10	"	8.25
D Grade S. & S. C.	7.35	"	8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	No prices		
Dry	No prices		

(Delivered)

No. 1 Domestic and Canadian	40.00	@	42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	3.87½
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	3.75
Strong Unbleached Sulphite	3.17½	"	3.75
News Grade, delivered			
Unbleached Sulphite	58.00	"	63.75

(On Dock, Atlantic Ports)

Kraft Bleached	4.12½	"	—
Kraft Light & Strong	3.50	"	3.90
Kraft No. 1	3.40	"	3.80

(F. o. b. Pulp Mill)

Kraft Domestic and Canadian	2.75	"	3.37½

(Delivered)

Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	6.75
Silesias No. 1	4.50	"	4.65
New Unbleached	6.25	"	6.50
Blue Overall	4.15	"	4.50
Fancy	3.25	"	3.50
Washables	2.00	"	2.15
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.00	"	3.15

Old Rags

White, No. 1—			
Repacked	3.50	"	3.65
Miscellaneous	2.75	"	3.00
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	1.50	"	1.65
Miscellaneous	1.10	"	1.25
Roofing Rags—			
No. 1	1.15	"	1.20
No. 2	1.00	"	1.05
No. 3 (bagging)	.90	"	1.00
No. 4	.60	"	.65
No. 5A	.60	"	.65

Foreign Rags

All prices nominal.

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

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No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	2.50	@	2.75
Wool Tares, light....	2.00	"	2.25
Wool Tares, heavy..	2.12½	"	2.25
Bright Bagging	2.25	"	2.50
Manila Rope—			
Foreign	5.25	"	5.50
Domestic	5.25	"	5.50
Jute Threads.....	2.75	"	3.00
Sisal Strings	2.10	"	2.35
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.25	"	2.50
Soft White No. 1..	1.80	"	1.90
Soft White Extra..	2.50	"	2.60
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag.....	.90	"	1.00
Solid Flat Book...	.80	"	.85
Crumbled No. 1...	.70	"	.75
Ledger White Stock.	1.70	"	1.75
Ledger Stock Colored	1.30	"	1.40
Manila—			
New Env. Cut....	1.70	"	1.80
New Cuttings.....	1.30	"	1.40
Old Kraft Machine Compressed bales..	1.40	"	1.50
News—			
No. 1 White News	1.75	"	1.90
Strictly Overissue..	.70	"	.75
Strictly Folded....	.45	"	.50
Corrugated	.40	"	.45
No. 1 Mixed Paper..	.25	"	.30

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.18	@	—
White Hemp.....	.18	"	—
Fine Polished—			
Fine India	.22	"	—
Unpolished—			
Box	.16	"	—
Paper Makers.....	.13	"	—
Tube Rope.....	.14¾	"	—
Wall Paper.....	.16	"	—
Wrapping	.16	"	—
Soft Fiber Rope...	.14	"	—
Cotton	.24	"	—

(Hard Fiber)

Medium Java.....	.10	"	—
Mex. Sisal	.09½	"	—
Manila	.23	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07	@	.07¾
New White No. 2.	.03½	"	.04
Light Silesias.....	—	"	.04½
Silesias, No. 1....	—	"	.04
Black Silesias, soft	—	"	.03
New Unbleached..	.06	"	.06¾
Washable Prints...	.02¾	"	.02½
Washable No. 1..	—	"	.01½
Blue Overall.....	.04	"	.04½
Cottons—According to grades—			
Washable shredding	—	"	.01½
Fancy Percales....	—	"	.03
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03½	"	.03¾
No. 2 Mixed.....	.01¾	"	.02
Corduroy	.01¾	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	1.35	"	1.50
Repacked	1.55	"	1.65
Black Stockings (Export)	3.50	"	4.00
Roofing Stock—			
Foreign No. 1....	Nominal		
Domestic No. 1...	1.20	"	1.25
Domestic No. 2...	1.00	"	1.05
Roofing Bagging..	.90	"	.95

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	Nominal		
Domestic	2.25	@	2.50
Manila Rope.....	—	"	5.50
Sisal Rope.....	2.00	"	2.25
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	2.55	"	2.75
No. 2.....	—	"	1.50
Wool Tares, heavy..	3.75	"	4.00
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	2.25	"	2.50

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.10	"	2.15
No. 1 Soft White.	1.90	"	2.00
No. 2 Soft White.	1.60	"	1.75
No. 1 Mixed.....	.90	"	1.00
Solid Ledger Stock..	1.90	"	2.00
Ledger Stock, white.	1.50	"	1.60
Ledger Stock, colored	1.10	"	1.15
No. 1 Books, heavy..	.80	"	.85
Manila Cuttings.....	1.75	"	1.80
Print Manila.....	.50	"	.55
Container Manila....	.40	"	.45
Kraft Paper.....	1.25	"	1.30
No. 1 Mixed Paper..	.25	"	.30
Straw Board Chip...	.30	"	.35
Binders Board Chip..	.30	"	.35
Corrugated Board...	.50	"	.60
Overissue News.....	.70	"	.75
Old Newspapers.....	.50	"	.55

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.75	@	3.00
No. 1 Soft White.	2.00	"	2.25
No. 2 Mixed.....	.75	"	.80
Solid Ledger Books..	1.50	"	1.75
Overissue Ledger Stock	1.75	"	2.00
Mixed Ledgers.....	1.50	"	1.75
No. 1 Heavy Books	1.10	"	1.20
No. 1 Books, Light..	.75	"	.85
Crumpled Stitchless Book Stock	.75	"	.85
Manila Env. Cuttings	1.85	"	2.00
Manila Envelope Cuttings, extra quality	2.35	"	2.60
White Blank News..	1.40	"	1.50
No. 1 Kraft.....	1.25	"	1.30
Extra No. 1 Kraft..	1.45	"	1.50
Mixed Papers.....	.30	"	—
Print Manila	.55	"	.60
Container Manila....	.60	"	.70
Old Newspapers.....	.50	@	.55
Paper Wool Strings.	.95	"	1.10
Overissue News.....	1.00	"	1.10
Box Board Chips....	.40	"	.45
Corrugated Boxes...	.45	"	.50
Kraft corrugated boxes	.85	"	.95
New Kraft Corrugated Cuttings	1.35	"	1.40
Screening Wrappers.	.70	"	.80

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	2.90	@	—
Domestic	2.75	"	3.00
Sisal Rope.....	2.50	"	2.60
Mixed Rope	.85	"	1.00
Transmission Rope—			
Foreign	2.50	"	2.60
Domestic	2.50	"	2.60
Soft Jute Rope.....	3.25	"	3.50
Manila Rope—			
Foreign	5.25	"	5.35
Domestic	5.50	"	5.75
Jute Carpet Threads	2.00	@	2.25
Bleachery Burlap....	4.00	"	3.25
Scrap Burlap—			
Foreign	2.60	"	2.65
Domestic	2.50	"	2.60
Scrap Sisal	2.50	"	2.60
Scrap Sisal for Shredding	2.30	"	2.65
Wool Tares—			
Foreign, Heavy...	2.40	"	2.50
Domestic	2.40	"	2.50
Aust. Wool Pouches.	2.75	"	3.00
New Burlap Cuttings	3.75	"	4.00
Heavy baling bagging	2.75	"	3.00
Paper Mill Bagging..	1.75	"	2.00
No. 2 Bagging.....	.75	"	.80

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.04	"	.04¼
New White No. 1.	.06¾	"	.07
New Light Flannelettes	.05	"	.05¼
Canton Flannel, Bleached	.06¾	"	.06½
Underwear Cutters, Bleached	.06	"	.06½
Silesias No. 1.....	.05	"	—
New Black Silesias..	3.00	"	3.25
Red Cotton Cuttings	.04	"	.05
Soft Unbleached...	.06	"	.06½
Blue Cheviots.....	.04¾	"	.04½
Fancy	.02	"	.02½
Washable	.02	"	.02½
Cottons—According to Grades—			
Blue Overalls.....	.04¾	"	.05
New Black, Soft..	.03	@	.03¼
Khaki Cuttings....	.02½	"	.03
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.06¾	"	.07½
New Canvas.....	.06¾	"	.07½
B. V. D. Cuttings...	.06½	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	2.75	@	3.75
Miscellaneous	2.40	"	2.60
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	2.00	"	2.25
Old Blue Overalls...	1.60	"	2.00
Thirds and Blues....	1.50	"	1.75
Miscellaneous	1.25	"	1.35
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.20	"	1.30
No. 2.....	.95	"	1.00
No. 3.....	.85	"	.95

Foreign Rags

(F. o. b. Boston)

Canvas	.04¼	@	—
Dark Cottons.....	(nominal)		
Dutch Blues.....	(nominal)		
New Checks and Blues	(nominal)		
Old Fustians.....	(nominal)		
Old Linsey Garments.	(nominal)		
New Silesias.....	(nominal)		

CHICAGO

Waste Paper

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings ...	3.15	@	—
No. 1 Hard White	2.50	"	2.65
No. 1 Soft White.	2.00	"	2.20
Ledger and Writings	.85	"	.95
Solid Books.....	.95	"	1.10
Blanks	1.50	"	1.60
Krafts	1.40	@	1.50
New Kraft Cuts....	1.60	"	1.75
Overissue News.....	1.00	"	1.10
Old Newspapers—			
No. 1 Folded News	.70	"	.80
No. 1 Mixed Paper	.40	"	.50
Roofing Stocks—			
No. 1.....	.95	"	1.00
No. 2.....	.85	"	.90

Philadelphia Association Elects Officers

The following directors were elected at the annual meeting of the Philadelphia Paper Trade Association on January 13.

Fine Paper Divn.—L. S. Bishop, Ralph Luff, John P. Schmidt, Ed. Walters, George Weaver and Wilson Whiting.

Wrapping Paper Division—Frank Dubin, George Goldman, George Hooper, W. B. Killhour, Jr., Nathaniel Saxe and C. A. Wilder.

The following officers were elected by the board of directors, at the annual meeting of the board of directors:

President: George Weaver, of Garrett-Buchanan Company; vice-president, in Charge of Fine Paper Division: Ed Walters, of Wilcox, Walter, Furlong Paper Company; vice-president, in Charge of Wrapping Paper Division: C. A. Wilder, of Wilder Bros.; Secretary: Wilson Whiting, of Whiting-Patterson Co.; Treasurer: L. S. Bishop, of Raymond & McNutt Co.

Herty Laboratory Gets $5,000

SAVANNAH, Ga., January 13, 1941—Contribution of an additional $5,000 to the support and work of the Herty Foundation Laboratory by Gen. Robert E. Wood, chairman of the board of Sears, Roebuck & Co., has been announced by Virgil D. Johnson, manager of the local Sears, Roebuck & Co., store.

General Wood offered $10,000 to the laboratory last year provided that substantial financial support be obtained from other sources. The first $5,000 gift to the laboratory was made in May, 1940, and now that conditions under which the original pledge was made, he has forwarded the remaining $5,000.